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THE AMPLITUDE OF ACCOMMODATION IN PRESBYOPIA*

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It is well known that the amplitude of accommodation decreases with increasing age. Extensive investigations on this problem have been made by Donders.[1] Kaufmann,[2] and Duane.[3, 4]

Donders measured the farpoint and nearpoint of clear vision for subjects between the ages of 10 and 80 years. He recognized three types of accommodation: absolute, binocular, and relative. For absolute accommodation, the farthest and nearest point of clear vision was measured for each eye. For binocular accommodation, the same points were measured but with binocular fixation. Relative accommodation was measured by the addition of convex and concave lenses binocularly while maintaining a given convergence. When the nearpoint of the absolute and binocular accommodation was farther than 22 cm. (8 Parisian inches), added convex lenses were used to image it closer. Black wires were used as the target and measurements were made with respect to the nodal point of the eye.

Kaufmann investigated the change in the amplitude of accommodation of 200 subjects between the ages of 5 and 68 years. Although his procedure was not described in detail it is assumed to be similar to Donders' investigation since Kaufmann intended to duplicate Donders' work on a larger number of subjects. Only subjects with "normal" visual acuity, low refractive error, and no pathological conditions affecting accommodation were included in his study. His results, in general, were similar to the results of both Donders and Duane.

*Read before the Second Western Regional Meeting of the American Academy of Optometry, Los Angeles, California, April 16, 1955. For publication in the January, 1956, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.
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Duane included in his study more than 1,000 subjects between the ages of 8 and 70 years. A careful determination of the refractive error was made of all subjects, using a cycloplegic on those below the age of 48 years. A single black line on a white card was used as the target to measure monocularly the nearest point of clear vision, using "first blur" as the endpoint. Convex lenses were used when the near-point of clear vision was farther than 40 cm.

The results of these investigations were very similar to one another, although there were some differences which have been pointed out by Hofstetter.[5] In general, the mean amplitude of accommodation decreased rapidly up to the age of 50 to 52 and then decreased only slightly during subsequent years. Even at the age of 60 years, there still remained approximately 1.50 D. of accommodation measurable.

It is widely known that a fixation object can be moved a finite distance toward or away from the eye before it is noticed to blur even when accommodation is held constant. This is due to the depth of focus of the eye. When the amplitude of accommodation is measured by the "push-up" method this factor becomes important in the determination of the endpoint. With maximum accommodation the target will be seen clearly if it is conjugate to the retina. However, the target can be moved closer to the observer before "blurring" is noted. This distance is the depth of focus of the eye and it is, nevertheless, customarily included as part of the measured amplitude of accommodation. Therefore, the "push-up" method should give measured values of the amplitude of accommodation which are artificially high.

A more accurate measurement of the dioptric change of the eye can be made by stigmatoscopy. Descriptions of stigmatoscopy have been presented by Ames and Gliddon,[6] Fry,[7] and Bannon et al.[8] In this technique a stigma (point source of light) can be optically placed so that it is conjugate to the retina. The dioptric distance of the stigma will then represent the refractive state of the eye. If now the accommodative state of the eye is changed, the stigma must be moved a dioptric distance equal to the change in accommodation. By using a series of increasing accommodative stimuli and measuring the accommodative response by stigmatoscopy, the amplitude of accommodation can be determined.

Thus, the influence of the depth of focus is minimized by stigmatoscopy and a more accurate measure of the true amplitude of accommodation can be made. It is the purpose of this investigation to compare the measurements of the "push-up" and stigmatoscopic amplitudes of accommodation in presbyopes.

PROCEDURE

A total of 106 subjects (212 eyes) were examined with a minimum of five subjects in each age group. The subjects were patients in the clinic at the School of Optometry and were selected on the following bases: (1) a complete visual examination within the last three months, (2) no known pathology, (3) visual acuity of 20/25 or better in each eye, and (4) ages 42 through 60 years. Several older subjects were tested but since their results were similar to the results of the 60-year-old subjects, the upper age limit for the statistical treatment of the data was set at 60 years. The birth date of each subject was recorded and the age calculated to the closest year.

With the subjective correction giving maximum visual acuity and a +2.00 D. lens in a trial frame, the amplitude of accommodation was measured monocularly for each eye by the "push-up" method. A nearpoint card with six point type was used as the target. Measurements were made with respect to the spectacle plane and "first blur" was used as the endpoint.

With the same lenses in the lens cells of the haploscope and one eye occluded, the subject was shown the change in the appearance of the stigma as the stigmatoscope knob was turned. When this operation was understood, he was instructed to focus the stigma using the same criteria for focus for all of the measurements. The same nearpoint card was used as the target and its luminance was kept at 5 ft.-L.

Five measurements of the accommodative response were made at each of the following distances: 60 cm., 50 cm., 33.3 cm., 28.6 cm., 25 cm., 22.2 cm., 20 cm., and 18.2 cm. With the +2.00 D. lens and the subjective correction, these distances correspond to stimulus levels of —0.33 D. and 0 to +3.50 D. in 0.50 D. steps.* This range of stimulus levels was sufficient to elicit the maximum amount of accommodation in all of the subjects, but if there was any doubt, additional measurements were made at higher stimulus levels. For the first six subjects, the measurements were made using optical distances as well as actual target distances, e.g., at 6 M. and at 50 cm. with a +2.00 D. add, or at 100 cm. and at 33.3 cm. with a +2.00 D. add. Since there were no significant differences in the results, optical distances were used thereafter for convenience. To help insure optimum accommodative response, the subject was instructed and constantly reminded to keep the print clear while focusing the stigma.

*a minus sign indicates an inhibitory stimulus to accommodation while a plus sign indicates an excitatory stimulus.

Approximately twenty to twenty-five minutes were required to complete all of the measurements for both eyes of each subject.

RESULTS

The results of the measurements are presented in Table 1. The "push-up" amplitudes of accommodation represent the mean of the right and left eye. The stigmatoscopic amplitude of accommodation was determined for each subject by plotting a curve of accommodative stimulus versus accommodative response. The amplitude of accommodation is then represented by the distance from the bottom to the highest point on the curve as shown in a typical curve in Figure 1. It is believed

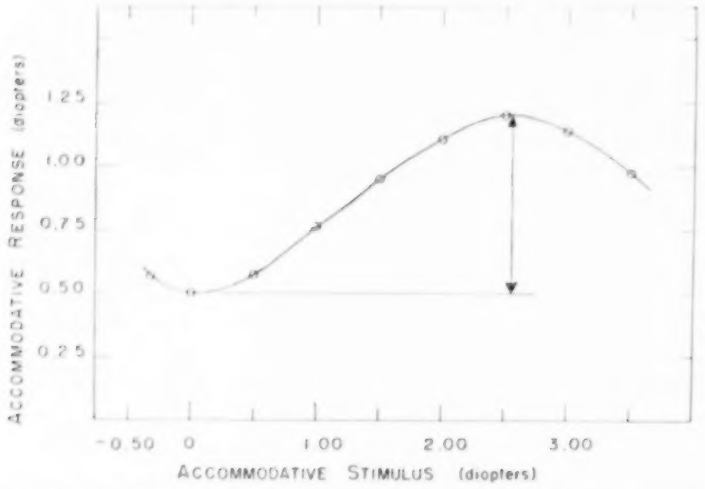

Fig. 1. Accommodative stimulus versus accommodative response curve. Accommodative response measured by stigmatoscopy. Accommodative amplitude is represented by the difference between the highest and lowest point on the curve on the response coordinate.

that the circle of least confusion of the conoid of spherical aberration, which is 0.50 D. to 0.75 D. in front of the retina, is used in stigmatoscopy. However, this concept does not effect our results since differences and not absolute values are used in the calculation of the amplitude of accommodation.

The mean amplitudes of accommodation, measured by the "push-up" method, are shown in Figure 2. In this and the following graphs, the abscissa represents the age in years while the ordinate represents the amplitude of accommodation in diopters. For comparison, the results of Donders and Duane are also shown. The values of the ampli-

TABLE I

MEAN AMPLITUDE OF ACCOMODATION IN DIOPTERS

Age	Number of Subjects	Push-up	stigmatoscopy right	stigmatoscopy left	stigmatoscopy mean
42	6	4.26	1.20	1.32	1.26
43	5	2.95	1.14	1.15	1.14
44	5	2.61	0.66	0.86	0.76
45	5	2.35	0.74	0.60	0.67
46	6	2.70	0.77	0.92	0.85
47	6	2.71	0.57	0.51	0.54
48	6	2.15	0.43	0.33	0.38
49	7	2.06	0.34	0.31	0.32
50	5	2.13	0.28	0.24	0.26
51	5	1.37	0.38	0.44	0.41
52	7	1.89	0.32	0.35	0.34
53	6	1.45	0.16	0.18	0.17
54	6	1.48	0.11	0.11	0.11
55	6	1.93	0.10	0.12	0.11
56	5	1.96	0.10	0.11	0.10
57	5	1.91	0.09	0.03	0.06
58	5	1.43	0.07	0.06	0.06
59	5	1.73	0.07	0.08	0.08
60	5	1.51	0.09	0.06	0.07

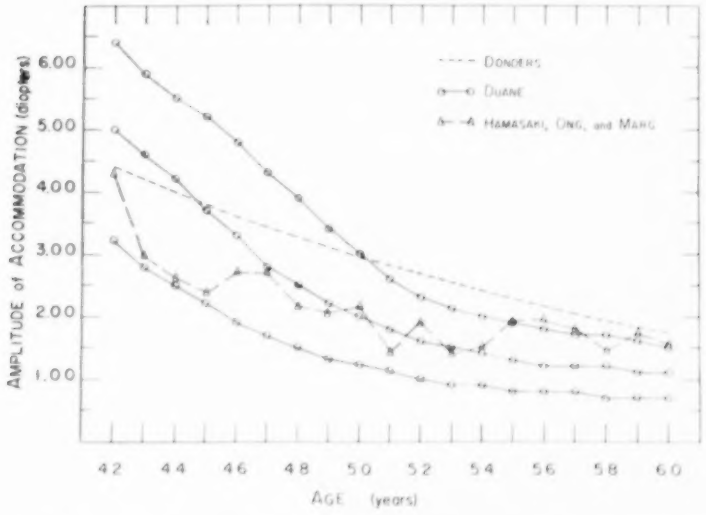

Fig. 2. Mean "push-up" amplitudes of accommodation. The upper and lower limits of normal variation of the amplitude of accommodation reported by Duane are also shown.

tude of accommodation used to plot Donders' curve were extracted from his curve and corrected for spectacle plane refraction. Besides the mean amplitudes of accommodation, the upper and lower limits of normal variation of the accommodative amplitude reported by Duane are shown. These limits were not statistically calculated but were drawn so that most of the data points were included within these limits.

A scatter diagram of the stigmatoscopic amplitudes of accommodation of the right and left eye of each subject is shown in Figure 3. The minus amplitudes of accommodation are due to experimental error of measurement. The mean amplitudes of accommodation are connected

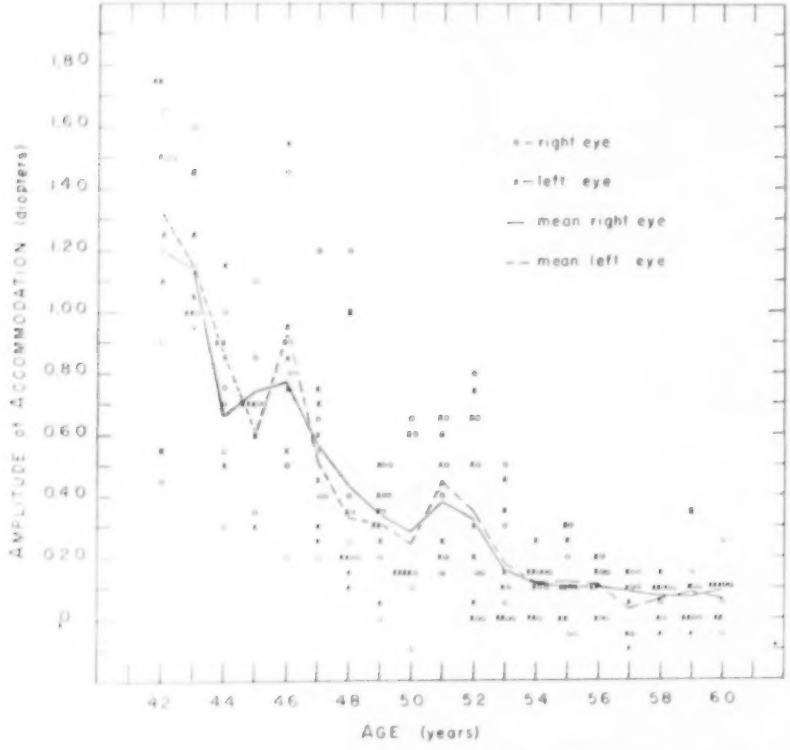

Fig. 3. Stigmatoscopic amplitudes of accommodation. The amplitudes of accommodation of the right and left eye of each subject are shown. The mean amplitudes of accommodation are connected by straight line segments. The amplitudes of accommodation of the right eye are displaced to the right while those of the left eye to the left of the age when there were more than one with the same amplitude of accommodation.

by straight line segments. Since there did not seem to be any significant differences in the amplitudes of accommodation of the right and left eye, the mean of the right and left eye was used in the statistical analysis.

In Figure 4 the mean log amplitudes of accommodation are plotted on a log scale together with the regression line on the mean log amplitude of accommodation on age. Also shown are the 95.0 per cent and the 50.0 per cent confidence limits.

The best fitting quadratic was also calculated. A comparison of the sums of the squares of the mean log amplitudes of accommodation from the best fitting straight line and the quadratic indicated that there was no significant difference, i.e., the decrease in the mean log amplitude of accommodation with increasing age could be described equally well by either equation. For simplicity, the best fitting straight line or the linear regression curve has been used.

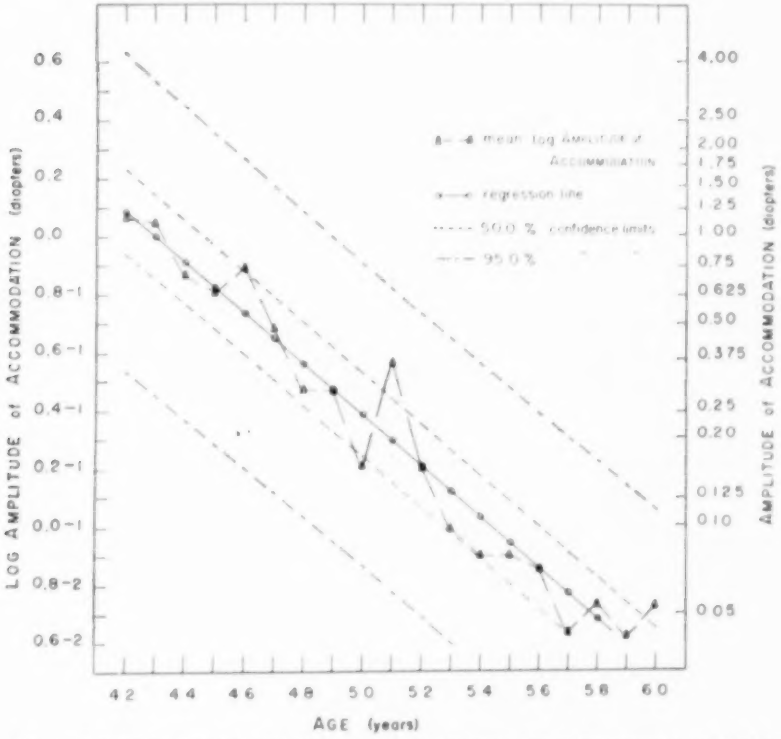

Fig. 4. Regression line and confidence limits for the mean log stigmatoscopic amplitude of accommodation.

For a comparison of the amplitudes of accommodation measured by the two methods, the mean "push-up" amplitudes of accommodation and the regression line with the 95.0 per cent confidence limits are shown in Figure 5. Also shown are the mean amplitudes of accommodation reported by Donders and by Duane.

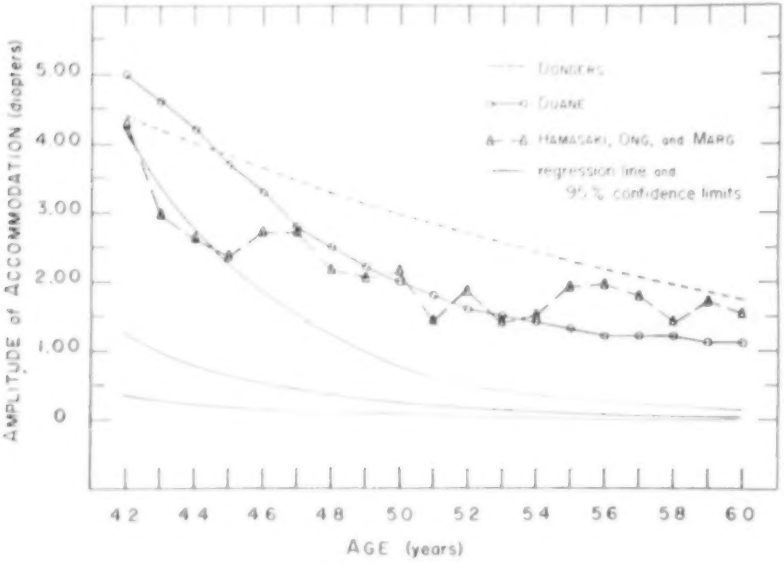

Fig. 5. A comparison of the amplitude of accommodation measured by "push-up" and stigmatoscopic methods. Donders, Duane, and Hamasaki et al. represent "push-up" amplitudes of accommodation. The regression line and the 95 per cent confidence limits were calculated from the stigmatoscopic amplitudes of accommodation.

DISCUSSION

The values of the mean amplitudes of accommodation measured by the "push-up" method in this study are similar to the amplitudes of accommodation reported by Donders and by Duane. Between the ages of 43 and 46 years the mean amplitudes of accommodation are lower than those reported by both Donders and Duane, while between the ages of 55 and 60 years they lie between the values reported by the two previous investigators.

Several factors can account for the differences in the three investigations, namely, size of sample, differences in the technique used in the measurement of the amplitude of accommodation, and differences in the method of determining the refractive error. An increase in the size of

the sample in this study would probably "smooth out" the curve and may also displace the curve up or down. Some of the differences in technique which may affect the results are illumination, targets, and the criteria used for the endpoint. The criterion used for the correction of the refractive error will definitely affect the value of the measured "push-up" amplitude of accommodation. This point was emphasized by Duane and he believed that a cycloplegic must be used to insure a maximum correction of the refractive error. However, it has been reported that a cycloplegic refraction may "overcorrect" the refractive error "in plus."[9] In these cases the value of the measured amplitude of accommodation will be higher.

Considering these three factors, the differences of the amplitudes of accommodation reported in this study and those reported by Donders and by Duane do not appear to be significant. Thus, it can be said that the mean amplitude of accommodation, measured by the "push-up" method, decreases rapidly up to the age of 50 to 52 and then remains essentially the same up to the age of 60 years.

Examination of Figures 3 and 5 shows that the amplitude of accommodation measured by stigmatoscopy is lower than that measured by the "push-up" method. The mean difference between the two is 1.75 D. This difference is essentially due to the depth of focus of the eye. After the age of 54 years the mean amplitude of accommodation is insignificant and can be considered to be zero.

From Figure 4 it can be seen that the decrease of the mean log amplitude of accommodation with increasing age may be described as linear. The coefficient of correlation between the amplitude of accommodation and age is —0.76. The equation of the regression line of the mean log amplitude of accommodation (A) in diopters on age in years is:

$$\text{Log } A = 3.767 - (0.088)\ (\text{age})$$

The equation of the best fitting quadratic is:

$$\text{Log } A = 6.977 - (0.215)\ (\text{age}) + (0.00125)\ (\text{age})^2$$

If the regression line is used to predict the mean amplitude of accommodation at a given age, the 95 per cent confidence limits include the range within which one may predict and be correct 95 per cent of the time. The same is true for the 50 per cent confidence limits.*

* The validity of these limits and the regression line is based on several assumptions. First, the regression of the mean log amplitude of accommodation is linear. Second, the log amplitudes of accommodation are normally distributed around the population mean. Third, the standard deviation of the log amplitudes of accommodation is constant for all ages.

This equation will not be valid for ages other than those studied in this investigation. A similar type of investigation must be done to determine the rate of change of the amplitude of accommodation for other ages.

A common technique used by clinicians to determine the spherical add for near work is the prescribing of an add which will leave a certain percentage of the amplitude of accommodation in reserve. This is based on the clinical impression that part of the amplitude of accommodation must be kept in reserve if the patient is to do extended periods of close work without discomfort. If the mean depth of focus is assumed to be 1.50 D. then a minimum spherical add of 1.00 D. should allow the patient to read at 40 cm. without using any accommodation. This would imply that the adds usually prescribed leave not part, but all of the amplitude of accommodation in reserve.

This investigation emphasizes the importance of the depth of focus in presbyopes. The importance of the depth of focus has been previously pointed out by Miles.[19] A decrease in the size of the pupil with increasing age would tend to increase the depth of focus, however, other factors such as the reduced clarity of the media and degenerative changes of the retina would tend to decrease the depth of focus of the eye.

Although this is not a longitudinal study, some evidence of the variation of the depth of focus with increasing age can be derived from an examination of the "push-up" and stigmatoscopic amplitudes of accommodation.

The mean amplitudes of accommodation reported by Duane show that there is a decrease of approximately 0.50 D. between the ages of 54 and 60 years. The amplitudes of accommodation measured by stigmatoscopy show a decrease of only 0.08 D. between these ages. This difference may possibly be due to a decrease of 0.42 D. in the depth of focus between these ages. If this is true then this may explain why adds are commonly increased after the age of 54 years.

On the other hand, if a constant value of 1.50 D. is added to the mean stigmatoscopic amplitudes of accommodation the resulting curve fits the "push-up" curve very well between the ages of 51 and 60 years. This would indicate that the depth of focus does not change between these ages. This then brings up the interesting point of why adds are commonly increased after the age of 51 years when both the amplitude of accommodation and the depth of focus do not show any significant decrease. One important factor that should be considered is the increased magnification provided by higher powered adds.

Thus no definite conclusions can be made at this time concerning the change of the depth of focus with increasing age. Direct measurements of the depth of focus should be made to solve this problem.

SUMMARY AND CONCLUSIONS

The amplitude of accommodation was measured on both eyes on 106 subjects, ages 42 through 60 years, by the "push-up" and stigmatoscopic methods.

A comparison was made between the mean "push-up" amplitudes of accommodation measured in this study and those reported by Donders and by Duane. In general, the mean amplitude of accommodation, measured by the "push-up" method, decreased rapidly up to the age of 50 to 52 years and then remained essentially the same until age 60.

The values of the stigmatoscopic amplitudes of accommodation were found to be significantly lower than the "push-up" amplitudes of accommodation. The difference is due to the depth of focus of the eye. After the age of 52 years the amplitude of accommodation is essentially zero (absolute presbyopia).

Statistical analysis of the data showed that the decrease of the amplitude of accommodation with increasing age could be described equally well by a linear or quadratic equation. The equation of the regression line of the mean log amplitude of accommodation on age is presented together with the 95 per cent and 50 per cent confidence limits.

Evidence for a change of the depth of focus of the eye with increasing age was contradictory and no conclusions could be made at this time.

The significance of the marked difference of the "push-up" and stigmatoscopic amplitudes of accommodation was discussed in relation to the prescription of spherical adds in presbyopes.

The authors wish to thank Assistant Professor Evelyn A. Fix of the Department of Mathematics, University of California, and Dr. William R. Gaffey of the Department of Public Health, University of California, for help in the statistical analysis.

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BOOK REVIEW

KERATOPLASTY. R. Townley Paton, M.D., F.A.C.S. Manhattan Eye, Ear & Throat Hospital. Published by McGraw-Hill Book Company, Inc., 330 West 42nd St., New York City. 280 pages. 87 illustrations including 29 color plates. Cloth. $28.50. 1955.

Very few surgical techniques could stand in the spot light of human emotions and be as deserving of the dramatic role as keratoplasty. It is that procedure whereby sight restoration may be possible by the replacement of opaque corneal tissue with clear tissue from a donor eye.

This is one book masterfully written and devoted to one idea. It tells the story of keratoplasty from its first mere suggestion, through the varied techniques and attempts during the eighteen hundreds to the present in which very significant success is being achieved. The third and fourth chapters offer an up-to-date review of corneal anatomy and physiology. The fifth chapter unfolds an enlightening outline of case selections which should better inform the optometrist as to the scope of keratoplasty.

Dr. Paton has done superb work in gathering information on keratoplasty to date and has given this comprehensive work a most extensive bibliography. This text achieves its authority through the vast experience and contributions to all phases of keratoplasty by Dr. Paton. This language and method of presentation of this book communicate its message easily and interestingly. Though it is primarily an eye surgeon's text, this reviewer doubts if the practicing optometrist or student could find a better book through which he might thoroughly familiarize himself with work that has been done and is being done with keratoplasty.

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MINOR SUGGESTIONS TO IMPROVE REFRACTIVE CARE*

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Small apparently unimportant things frequently have their effect on more important serious matters. The effect of a well performed examination for instance, may, in the patients' mind be nullified completely by the failure of the optometrist to observe some nicety of chairside manner or by the omission of some small detail.

These procedures and practices are usually known to us all. They are sometimes mentioned in the literature—but they are now and then overlooked in the pressure of daily practice. Each in itself is minor in its application to overall optometric practice, yet in some small way each plays a part in maintaining a successful practice. There are many of these items, and in this report the writer has selected only a few to highlight the need for attention to detail.

The writer is in the general practice of optometry. His practice is a large one and over the years he has also done some orthoptic work, contact lens fitting and a considerable amount of sub-normal visual correction. It is from this practice experience of 30 years duration that the following suggestions are drawn.

These suggestions are not original and the material which follows is not presented in an orderly sequence. In fact there could be no such sequence, as the items are unrelated and each is only a suggestion which to become relevant must be fitted into its proper place in case planning when the need arises.

FAMILY HISTORY

In taking the patient's history, the optometrist should be certain to get as much data as possible on the health and eye problems of the parents and grandparents of the patient. Such information is occasionally useful in giving clues to ocular abnormalities that might remain obscure or even unknown without these data. For example, a family history of diabetes would alert the optometrist to watch for marked changes in the refractive findings and would also warn him to determine the patient's present physical condition through consultation with the patient's physician. Other illustrations will occur to the reader as

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information of this sort is invaluable in making a prognosis and without such data serious errors may be made.

HIGH POWERED READING ADDITIONS

In certain cases we should not overlook the value of high powered reading additions. Near-point accommodative tests and Donders' table of accommodative regression and the need for convex additions do very well as a guide in the great majority of cases, but there are exceptions wherein the patient simply can not see to read unless he is supplied with binocular reading adds of +4.00 D., or +5.00 D. Other patients require monocular reading adds up to +20.00 D. on occasion. While it is true that these higher reading adds shorten the range of near-point vision we should remember that it usually is far better to enable a patient to see to read at five, six or seven inches than to not enable that patient to read at all. In these cases we must not be afraid to upset the accommodative-convergence balance by means of these high powered additions. We know that these patients with sub-normal vision already usually have an imbalance and the ability to read is worth far more to these patients than anything else that we can do. We should also remember that it frequently is well to sacrifice poor binocular near vision to achieve good monocular near vision. Many patients with lowered visual acuity at the near-point will accept very short binocular or monocular reading ranges.

USE OF LIGHT WEIGHT PLASTIC LENSES

In prescribing high powered corrections much further consideration should be given to the use of plastic lenses. This suggestion is not made because these improve the patients visual acuity, but rather because plastic lenses are much lighter in weight and therefore more comfortable to wear. For such patients the writer uses the British made, I-Gard Plastic Lenses, as supplied by the McLeod Optical Company of Providence, Rhode Island, with considerable success. With care, these lenses are frequently used for two or even three years without scratching.

Other patients who require the use of these light weight plastic lenses are those whose noses will not stand the weight of regular spectacles. Fortunately these patients are few and far between, but when plastic lenses are prescribed for them the skin of the nose usually heals at once.

ADJUSTABLE PAD BRIDGES

While it should not be necessary to mention this, it is nevertheless true that many patients wearing bifocals or trifocals are still fitted with rigid non-adjustable solid plastic pad bridge frames. Every time this

is done the optometrist is risking failure.

These frames are splendid for single vision corrections but are frequently unsatisfactory for the multifocal corrections as it is impossible to adjust the pads on the bridge to alter the vertical placement of the reading segments. This is a small matter but is one that has caused much unpleasant doctor-patient relationships.

ORTHOPTIC WORK

The writer's experience in orthoptics dates back to the time of Hazen[1] and Robinson.[2] Both were early Academy members and also close associates of the writer. Both did much to bring to the attention of optometrists the value of certain forms of orthoptics—particularly in some squint cases and in developing higher levels of convergence in cases where the findings that measured this function were consistently low. What we now call orthoptic work was then called "oculo-prism treatment."

Since then, much of value and much more of doubtful value has been added to the literature and techniques of optometrists who practice in the field of orthoptics. This is not a paper on orthoptics, but the writer has one observation he would like to make. It will not be a popular one in certain quarters but it should be made. In the writer's judgment less than 15 per cent of our patients can be, in any way, benefited by orthopics or visual training.*

Furthermore, an over-emphasis of orthoptics in any general optometric practice will in time ruin such practice. The writer believes this to be true unless the practitioner is specializing in orthoptic work on referred cases only, and then of course he is not in general optometric practice and the above comment would not apply.

WHO SHOULD TAKE THE CASE HISTORY

Earlier in this report the case history was mentioned. To return to this for a moment let us make one more observation. The optometrist should always take the history himself. In the past the writer has attempted to delegate this work to others—either office assistants or to a secretary. While it is true that they can and do record much of value, it seems also that much is lost by doing it in this way. The writer has found that most patients appreciate talking directly with the optometrist. In doing so they will usually supply the record with more detailed information of later value in the case. Certainly the optometrist will

[1]E. H. Hazen, M.D. Ocular Orientation. 1923.
[2]S. H. Robinson, O.D. Oculo-Prism Treatment. 1924.
*This figure does not include patients who are slow readers or students who have reading problems.

have a better understanding of the facts if he listens to their presentation directly. In addition, the personal taking of the history helps develop a close professional tie between the patient and the optometrist. In the writer's judgment this work should not be delegated to others.

LIGHTING IN THE REFRACTING ROOM

In the older texts on refraction the examination and refracting rooms were always referred to as "dark rooms," and as the writer recalls, those of years ago were dark indeed. One even had black walls. This perhaps had some advantage in doing retinoscopy, an ophthalmoscopic examination, or in doing muscle testing with a small fixation light, a colored disc and a Maddox rod. But it certainly made our work harder and poorer in all other phases of the examination and refraction. Today examining rooms are bright and cheerful and as many tests as possible should be made under full illumination. This is particularly true of the all important subjective tests. Our patients live in well lighted surroundings and their final prescriptions should be based on findings taken under good illumination.

INFRA-RED ABSORPTION

While there is only some supportive clinical evidence for this suggestion, it might be well to consider the use of ophthalmic glass with a very low transmission in the infra-red end of the spectrum for certain patients. In cases of very early non-complicated senile cataract the theory of this technique is that in these cases the absorption of infra-red radiation by the crystalline lens causes it to fluoresce, and this in turn over a long period of time will alter its normal metabolism causing more or larger opacities to appear.* This, to be sure, is only a theory, yet in a sufficient number of clinical cases the wearing of infra-red absorption lenses, ground to the patient's individual prescription has seemingly slowed the further development of the opacities.

For these patients, in the writer's practice, he prescribes Therminon lenses made by the Therminon Lens Company of Des Moines, Iowa. These lenses transmit very little of the infra red end of the spectrum. The lenses are inconspicuous and patients report them pleasant to wear. As has been said there is some clinical support for this technique and in any event no known harm has come to patients from the constant use of infra-red free glass as the correction is otherwise the same as would have been prescribed if regular white ophthalmic glass had been used.

*E. Leroy Ryer and Elmer L. Hotaling. A New Absorption Lens for Use in Selected Cases of Senile Cataract with Negative Histories. Am. J. Optom. 14.7. 244-260. 1937.

LABORATORY WORK

It seems to the writer that only one optometrist in ten has any aptitude for optical laboratory work. In other words, there are really few good optical bench-men among optometrists. It follows then that unless you are one of the few who are gifted in these mechanical arts it would be well for you to refrain from attempting this type of work in your own office. Your patients will be much better served by you if you purchase all the materials you prescribe in completed form from a first class laboratory where skilled technicians are employed. And as a reciprocally related point that still needs to be stressed—only first quality materials should ever be dispensed for your patients.

CENTRAL FIELD STUDIES

Routine central field studies are being made by more and more optometrists on all of their patients over 40 years of age. As a professional group optometrists are very conscious of the possibility of glaucoma and a large and growing number are now charting the central fields as a routine matter. These field studies, done with a very small target (1/1000), supplement their ophthalmoscopic findings; the inspection of the anterior chamber and their check of the patient's intraocular tension by means of scleral tonometry. Every effort must be made to have all of these essential tests incorporated into the every day examination routines of all optometrists for use on all of our senior adult patients. In the patient's best interest these are necessary tests.

PROGNOSIS

Most patients appreciate having their optometrist review their condition for them after the examination has been concluded. Such brief reviews should include a short prognosis in which the patient is told what to expect in the future. These case reviews need not be lengthy and certainly should not be highly technical. They can be presented in such a manner as to build confidence and security in the mind of the patient. The optometric service is not complete unless this has been done.

NON-CENTRALIZATION OF TESTS

Over the years the tendency has grown to group all examination and refractive tests around the ophthalmic chair, and to do all work on the patient at this central point. After trying this and other related plans, the writer has come to the conclusion that this centralization is a physical and psychological mistake. Where space permits, the writer feels that it is wise to occasionally move the patient to other areas in the office for some of the routine specialized techniques that are to be

employed. The optometrist, too, will be more relaxed and rested if this suggested office procedure is followed.

HEAT TREATED LENSES

In prescribing for the very young and for all children in the secondary schools, the optometrist should prescribe only heat treated nonbreakable lenses. The added security and satisfaction this gives to both the optometrist and the parents of the patient makes the small added cost of little consequence. It is obvious, too, that the same type of heat treated lenses should be prescribed for many vocational and sports corrections.

OXFORDS

Many presbyopic women and some presbyopic men who are otherwise emmetropic enjoy using oxford eyeglasses on occasion. As optometrists we should prescribe more of these, as an extra pair of reading glasses. For a considerable period, during and after World War II, these frames were not available, but they are again being made and serve a most useful purpose with certain patients. For the younger optometrist who has never prescribed an oxford eyeglass mounting, the advantage of these is, that it is put on and taken off readily and that it is easily available as it hangs around the patients neck on a ribbon or chain.

AN OPHTHALMOMETER

In the writer's judgment no refracting room is complete without an ophthalmometer that is used during every refraction. Optometrists who haven't one, should get one. The results obtained with this instrument identify at once those patients with corneal astigmatism, or corneal irregularities that result in reduced vision. In astigmatic patients the corneal meridians of greater and lesser powers are thus known making our retiniscopy and subjective testing not only more accurate but much easier.

THE MATTER OF STYLE

As optometrists our lives are inevitably tied in with the important subject of style in glasses. Not only will this trend continue but it will grow in emphasis and in awakened public interest. As optometrists we should play an important role in this development as the trend in making eye-wear attractive is of tremendous importance to us as the present day beauty of frames removes most of the former objections to the use of corrective spectacles.

In this work we must, of course, make the distinction between "fad" and "fashion and style." There is a big difference, and styling

should not interfere with essential optical factors. For example, bifocal wearers, as has been stated earlier, should be limited to those frames with adjustable pads, even though they might find rigid bridges more stylish. Very extreme shapes of lenses that limit the field of view should be excluded and as a safety measure there should be no projecting sharp edges on the frames. In addition, for those patients in great need of a correction and who wish only one pair of glasses, these patients should be restricted to frames without stone trims. As Hirsch* has stated, "How ludicrous, to go without one's glasses for a week, while the optometrist has the diamonds' in the glasses reset." And last, all temples should be adjustable.

For a large portion of the public, our offices are the focal point in this entire matter. It is in these offices that we play our role in the art of translating an ocular prescription into a pleasing and stylish pair of glasses.

To do this work most effectively we should, wherever possible, set up special dispensing rooms where attractive frames can be seen and sampled by patients under the supervision of an assistant. Once the selection is made, the optometrist would then take the appropriate facial and frame measurements. Most office girls can be trained to discuss frame styling, and enjoy showing various frames to patients. Patients enjoy not only looking at attractive frames, but also trying them on, so many mirrors should be present. A little extra space—some attractive decorations, mirrors and furniture as well as a number of samples, plus some planning and training will set up an attractive and efficient dispensing room that will please patients and conserve time for the optometrist.

REFRACTIVE ROUTINES

The writer has no quarrel with refractive routines or sequences of procedure. In some respects, they make our work easier for us. In the earlier days of his practice, the writer helped to popularize the 17-point refractive routine that was suggested by Charles Sheard. Incidentally, it was this very routine which was later adopted by the Optometric Extension Program, and subsequently amplified to the present 21-point routine.

The writer has also devised variations of these routines. But, we should remember that the suggested routine—whatever it is—is only a guide, or a suggested outline of procedure. There is nothing sacred

*Monroe J. Hirsch. Personal correspondence

about it, and should it call for unnecessary testing in a particular case, the routine should then be disregarded as it applies to that patient.

During the course of a refraction, tests that cannot produce findings of value should not be made. Patients tire easily and will appreciate your doing only such things as are really necessary to produce the best results.

LIBRARY CORRECTIONS

Whenever possible for the ametropic presbyopic patients who wear bifocal corrections one should also prescribe a single vision library set of reading glasses. There are many times that these will prove most handy and the patient will appreciate this thoughtfulness on your part.

SPECIAL COPY OF THE PRESCRIPTION

Should you know that the patient travels considerably or is planning a trip, give him a copy of his prescription to carry with him. In doing so, it will give the patient a feeling of security and he will appreciate this interest in his welfare. When this is done the prescription should be complete with such important items as base curves, centering and frame details.

RETINOSCOPIC REFLEX

As the notes for this report were being assembled, a patient was referred to the writer. The patient, a boy aged 7, had never used a correction, and his vision was O.D., O.S., O.U., 20/300. The referring doctor had not prescribed for him as he was unable to improve vision in the subjective techniques he had employed and he was also unable to secure a proper retiniscopic reflex. The low visual acuity findings might have flagged this case for him as one of high ametropia.

With a starting —9.00 D. sph. O.U. in place the retinoscopic reflex was good and bright and easy to neutralize. The patient required O.U. —11.50 D. sph. He was also referred to a child specialist for a physical check up.

When the retinoscopic reflex is poor always try using higher powered lenses, both plus and minus before giving up on the case. Because ametropes of large amounts are infrequently seen they sometimes puzzle refractionists. It is in these cases that the higher powered spheres and cylinders in your trial case have real value.

WE ARE OPTOMETRISTS

Another thought that seems worth mentioning at this time is, that we should remember—in the patient's best interest—that we are optometrists, and not clinical psychologists. It seems to the writer that we should relegate mental abnormalities to those practitioners whose

training is such that they may cope with these problems with at least some hope of success.

Obviously we all understand some psychology and employ this in our practices. Psychological training is required in our undergraduate profressional courses. What I am referring to is the use of psychology within the sphere of optometric training and practice which is both essential and proper, in distinction from the occasional optometric practitioner who practices a broader type of clinical psychology without adequate background training.

INDIVIDUAL PATIENTS—NOT ROUTINE REFRACTIONS

If you are like the majority of optometrists, most of your work consists of examinations and refractions. As individual practitioners we do a great many of these, and each is and should be a fine and special thing. Unfortunately, particularly in rush periods, we occasionally may be prone to lose sight of this, and treat our patients just as routine refractions and not as individuals seeking care and attention.

When this happens, we should remember that an examination and refraction is a real and outstanding event to the patient. Money has been put aside to make it possible and considerable discussion, planning and thought has preceded the patient's visit to the office.

If we pass over this event in a hurried or offhand manner, the patient is sure to have a negative reaction, even though the final prescription is correct in every detail. Therefore, it is essential that we always bring to every refraction the true enthusiasm and interest we really have in the case, thus making the patient feel that he is an individual for whom we are doing everything possible to insure his comfort and future well being.

Each patient must be made to feel that he is the chief patient of the day, and that you as his optometrist are just as interested in his visual well being as he is himself.

CONCLUSION

In closing this report, the writer would like to make one more suggestion. Pay no attention to the doctor-down-the-street or in the nearby town. You have only one responsibility, and that is to worry about your own office and your ability to please your patients and properly serve them. If you are doing this in the fullest degree, your patients will show little or no interest in other doctors, and will keep your reception rooms filled at all times with their appreciative and friendly referrals.

THE EFFECT OF LUMINANCE, TARGET CONFIGURATION AND LENSES UPON THE REFRACTIVE STATE OF THE EYE*

PART I

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INTRODUCTION

The problem of determining the relationship between changes in refractive state and changes in illumination or in the structure of the visual field has been attacked by numerous investigators. A comprehensive review of these is available in the survey made by Knoll.[1] Recent studies germane to the present investigation include those by Whiteside,[2, 3] Whiteside and Campbell,[4] Campbell,[5] and Wald and Griffin.[6]

The present paper stems from a research project carried on under contract with the United States Air Force, which had as its objective the quantitative determination of changes in the refractive state of the eye with variations in the level of luminance. Fixation targets to be used were specified as (a) those which might be assumed to stimulate and (b) not to stimulate accommodation, respectively. Specifically mentioned as an example of the latter was a blank wall, free from any detail.

In the present report, only that part of the investigation concerned with the selection of the appropriate targets will be discussed. In this phase of the study, each of three observers was required to fixate a number of somewhat arbitrarily chosen targets, each of which was viewed through a succession of lenses ranging from +1.00 diopter through —5.00 diopters, in 1.00 diopter steps. Accommodative response was ascertained by means of a modified stigmatoscope, though, in the final stages of the investigation an infra-red skiascope was employed to determine changes in the refractive state. The specific objective was to determine which of a number of targets was the "best" and which the "poorest" in eliciting a magnitude of accommodative response com-

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The authors gratefully acknowledge their indebtedness to Professor Frank W. Weymouth for invaluable assistance with the statistical phases of the study.
Part II of this report will appear in the February issue.
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mensurate with the magnitude of the stimulus represented by the power of the lens applied before the eye.

APPARATUS

As stated, changes in the refractive state were measured in the preliminary phase of the investigation by means of a modified stigmatoscope, and, in the later stages, by means of the infra-red skiascope. The optics of the latter instrument have been adequately explained by both Fry[7] and Knoll.[8] With reference to the stigmatoscope, complete descriptions of both structure and function will be found in several of the references cited, such as Wald and Griffin,[9] and Whiteside.[10] Similar information is provided by Knoll[11] and by Hofstetter.[12]

One modification made in the stigmatoscope was that the stigma or spot usually employed as the collimated optometer pattern was found unsatisfactory in measuring threshold responses, and a line pattern was substituted instead. The vertical line or slit was achieved by scoring a silvered mirror with a fine needle. The mirror was then mounted at one end of a barrel, the other end of which contained a light source to illuminate the slit. Over the slit was placed a green filter (Eastman-Kodak N-61), having a narrow transmission band, whose purpose it was to prevent changes in the color of the illuminated slit with changes in light intensity brought about by use of a variac. The barrel containing the illumination source, slit, and filter was movable backward and forward along a track.

Two methods of bringing the slit into focus for the observer were employed. One way was to move the barrel as far from the stationary collimating lens as possible and gradually bring it toward the lens until the vertical slit was just perceived by the observer fixating a distant object through the half-silvered mirror of the stigmatoscope. The second method was to bring the barrel as close to the lens as possible and move it away until the slit was just perceived. In either case, the slit was first adjusted in brightness to the observer's threshold of discrimination. The first method delineates the most hyperopic end of the depth of focus range, whereas the latter method establishes the most myopic boundary of the interval.

The best guess of the mid-point of the depth of focus interval outlined by these two boundaries is represented by the arithmetic mean of their values. This, however, is likely to yield a measurement of the refractive state which is between 0.50 and 1.00 diopter more on the myopic side than would be obtained by the conventional static retinoscopy or subjective examination.[13*] Nevertheless, since the preliminary

*See note with reference, page 42.

phase of the investigation was concerned with the relative, not the absolute values, the arithmetic mean of the two boundary values was adopted as the measure of the refractive state. It is also possible that this value is more stable than that representing either end of the depth of focus, an additional reason for the choice adopted.

The method of obtaining the desired level of luminance was as follows: The research was carried on in a laboratory room whose dimensions were: length, 25 feet; width, 7 feet; height, 7 feet. The ceiling and three walls were painted a dull black, with reflection of stray light kept to a minimum by the matted surface. The end-wall farthest from the observer was painted a flat white. Fixation targets were painted on thin metal discs which were held in place against the wall by a magnet mounted behind the latter. They were removed from the wall by a smaller magnet, which prevented targets and wall from becoming soiled.

Low levels of luminance were achieved by employing a TDC 750-watt projector mounted on a bracket outside of the laboratory wall located just behind the subject. A hole just large enough to accommodate the projector beam was cut in the wall. A black hood fastened to the wall encircled the barrel of the projector in order to prevent any stray light from entering the aperture.

Illumination of the far white end-wall of the laboratory by the projector lamp yielded a luminance of ten foot-lamberts. Reductions in this level were accomplished by inserting one or more Eastman-Kodak wratten gelatin neutral density filters in front of the projector beam. Two such types of filter were used: a 0.6 filter, with 25 per cent transmission; and 0.3 filter, with 50 per cent transmission.

To achieve luminances higher than ten foot-lamberts, eight General Electric 300-watt spot lamps were used. These were mounted in adjustable clamps which, in turn, were fastened to two black portable wooden brackets, four lamps to a bracket. By adjusting their distance from the white end-wall, and by varying the number of lamps used, variations in luminance from 10 to 300 foot-lamberts were achieved.

In so far as selection and construction of the targets were concerned, the white end-wall of the laboratory served as one of the targets. It approximated an empty visual field in that it was a flat white, homogeneous, unmarked surface, 7 feet by 7 feet. Other targets consisted of a blank, white, circular disc, 2 inches in diameter, and similar discs on which were painted, in India ink, various sizes of Snellen "E" letters (20/20, 20/40, 20/60, 20/80, and 20/160), and two sizes of black dots, each arranged in a hexagonal pattern, after the work of

Whiteside.[14] Additional targets used were a 20/400 Snellen "E," made of cardboard and painted a flat black, and two round pins, one subtending an angle of 2 minutes, 15 seconds at the nodal point of the eye, located 20 feet distant, and the other subtending an angle of 4 minutes, 30 seconds.

A final target employed was a fine black thread, hung from the ceiling and extending to the floor, and bisecting the blank end-wall. The purpose of this type of target was to determine whether stimulation of the more peripheral parts of the retina would yield a better accommodative response than targets stimulating only a small central area of the retina.

All brightness levels were measured by means of a Luckiesh-Taylor brightness meter. All measurements were made by the senior author.

PROCEDURE

Three subjects were used in this phase of the investigation: CG, DK, and MN. One of the three, CG, had no knowledge of optometry or optics, and was presumably a naive observer. DK was a senior student at the Los Angeles College of Optometry, and was informed of the nature and purpose of the study, so that he may be considered an enlightened observer. The senior author acted as the third subject.

Each subject observed a number of targets located twenty feet distant from the spectacle plane of the modified stigmatoscope. Subjects DK and CG were emmetropes; MN wore concave lenses to achieve this condition artificially. Each target was viewed without any lenses placed before the eye in the lens well of the instrument, and also through a series of lenses ranging from +1.00 diopter through —5.00 diopters, in 1.00 diopter steps.

The observations were made at three levels of luminance: 0.05-0.10, 60-90, and 175-250 foot-lamberts. (The luminance level varied somewhat with the target used.) At the lowest luminance level, it was found that certain targets could not be perceived unless the size was increased, and so in some instances several sizes of the target were employed. The consequence of the introduction of the size factor was that some attention had to be devoted to the variation in accommodative response with various combinations of target size (20/20 to 20/160 Snellen "E" letters) and lens power (zero through +1.00 diopters, in 0.25 diopter steps).

Twenty readings were made by the subjects under each set of conditions provided. That is, with the observer viewing a given target through successive lens changes under a given level of luminance, twenty

stigmatoscopic readings were taken for each lens power employed. Of the twenty readings, ten were taken in the manner described above to delineate the hyperopic end of the depth of focus interval, and the other ten were taken so as to demarcate the myopic boundary of the interval.

For purposes of obtaining a mean and standard deviation of each set of readings, the two limits were averaged, and the value so determined was used as a best guess of the mid-point of the depth of focus interval. In addition to the statistical analysis of the data, graphic recording was made of the mean and standard deviation of each set of responses.

RESULTS

The mean and standard deviation obtained for the responses of each observer under each set of testing conditions are shown in Tables I, II, and III.

To compare the correspondence of the accommodative stimulus and response magnitudes, Figures 1 through 9 were constructed. As will be seen from Figure 1, the dioptric stimulus to accommodation, represented by the power of the lens employed for the purpose, is represented on the abscissa. The dioptric response value, as measured with the modified stigmatoscope, is represented on the ordinate. The dotted line, showing theoretically perfect agreement between the stimulus and response values, serves as a reference line against which to measure the amount of over- or under-accommodation occurring in response to each stimulus value.

In Figure 1 and the succeeding figures it will be noticed that, in all cases, there seems to be a considerable *over*-accommodation with no lenses before the eye. This, as was stated, seems in large part to be an artefact, primarily because haploscopic determination of the refractive state does not locate the point of neutralization within the depth of focus interval at the same place as established by the static retinoscopy or subjective examination. If we accept Morgan's figures of 0.50 to 1.00 diopter greater negativity in the stigmatoscope readings, it can be seen that correcting the plot in Figure 1 by that amount would make the response values nearly coincident with the stimulus value for practically all the targets.

Of more concern than the absolute response values to given stimulus values are the *comparative changes* in response. In Figure 1 it will be observed that, for four of the five targets, the addition of a +1.00 diopter lens, instead of relaxing the accommodation as would be expected, *increases* the accommodative response. This increase is on the

TABLE I

MEAN AND STANDARD DEVIATION OF RESPONSES BY THREE OBSERVERS TO TARGETS OBSERVED MONOCULARLY THROUGH A SERIES OF LENSES AT A HIGH LUMINANCE LEVEL

Target	Observer / Lens Power		CG +1.00	CG 0.00	CG −1.00	CG −2.00	CG −3.00	CG −4.00	DK +1.00	DK 0.00	DK −1.00	DK −2.00	DK −3.00	DK −4.00	MN +1.00	MN 0.00	MN −1.00	MN −2.00	MN −3.00	MN −4.00
	*	$\bar{X}$	−0.54	−0.93	−1.42	−2.04	−2.90	−3.56	−0.94	−0.90	−0.92	−1.12	−1.20	−1.30	−0.28	−0.54	−1.20	−2.24	−3.15	−3.90
Red pin ($2\frac{1}{4}$")	**	σ	0.117	0.242	0.146	0.111	0.135	0.160	0.104	0.152	0.092	0.097	0.120	0.203	0.130	0.103	0.098	0.060	0.088	0.094
Snellen		$\bar{X}$	−1.14	−0.80	−1.50	−2.09	−3.02	−4.03	−0.94	−0.88	−1.25	−2.30	−3.20	−4.28	−0.08	−0.36	−1.26	−2.29	−3.17	−4.08
"E" (20/20)		σ	0.262	0.201	0.215	0.124	0.165	0.162	0.102	0.085	0.113	0.099	0.090	0.125	0.079	0.053	0.100	0.057	0.140	0.137
Blank		$\bar{X}$	−1.86	−1.32	−1.98	−2.82	−3.67	−4.66	−0.58	−0.76	−1.10	−1.77	−3.04	−4.14	−1.24	−0.68	−1.26	−2.30	−3.13	−4.20
White Disc (2")		σ	0.151	0.280	0.130	0.138	0.183	0.350	0.171	0.162	0.156	0.100	0.186	0.195	0.247	0.092	0.170	0.112	0.142	0.130
Hexagonal		$\bar{X}$	−1.32	−0.59	−1.40	−2.32	−3.23	−4.18	−0.76	−0.69	−1.12	−2.18	−3.00	−4.20	−0.05	−0.41	−1.28	−2.32	−3.24	−4.08
Pattern of Dots (small)		σ	0.225	0.091	0.069	0.147	0.149	0.138	0.161	0.102	0.071	0.089	0.161	0.159	0.183	0.110	0.134	0.071	0.169	0.129
Blank		$\bar{X}$	−1.02	−0.81	−1.40	−1.83	−1.66	−2.65	−0.94	−1.08	−1.06	−1.21	−2.34	−1.67	−0.70	−0.52	−0.54	−1.03	−0.96	−1.44
White Wall (7'x7')		σ	0.187	0.235	0.211	0.259	0.233	0.374	0.156	0.058	0.073	0.174	0.222	0.189	0.198	0.186	0.175	0.184	0.192	0.218

* $\bar{X}$ — Arithmetic mean of 20 readings
** σ — Standard deviation

TABLE II

MEAN AND STANDARD DEVIATION OF RESPONSES BY THREE OBSERVERS TO TARGETS OBSERVED MONOCULARLY THROUGH A SERIES OF LENSES AT A MEDIUM LUMINANCE LEVEL

		CG						DK						MN					
Observer Lens Power		−1.00	0.00	−1.00	−2.00	−3.00	−4.00	−1.00	0.00	−1.00	−2.00	−3.00	−4.00	−1.00	0.00	−1.00	−2.00	−3.00	−4.00
Target: Red Pin	$\bar{X}$	−2.20	−2.26	−1.52	−2.32	−2.76	−3.80	−0.94	−1.04	−1.10	−1.32	−1.43	−1.17	−0.87	−0.61	−1.39	−2.34	−3.56	−4.40
(2¼")	σ	0.177	0.139	0.175	0.062	0.100	0.203	0.139	0.117	0.103	0.164	0.434	0.186	0.169	0.110	0.102	0.070	0.140	0.063
Snellen	$\bar{X}$	−2.24	−0.82	−1.6	−2.23	−3.44	−4.00	−1.01	−0.86	−1.08	−2.03	−3.20	−4.40	−0.60	−0.48	−1.37	−2.30	−3.44	−4.30
"E" (20/20)	σ	0.188	0.142	0.124	0.170	0.239	0.209	0.100	0.071	0.108	0.127	0.135	0.114	0.222	0.068	0.118	0.157	0.080	0.131
Blank	$\bar{X}$							−1.07	−1.28	−1.26	−2.34	−3.50	−4.40	−0.98	−0.47	−1.02	−1.96	−2.84	−4.44
White Disc (2")	σ							0.192	0.142	0.135	0.242	0.119	0.136	0.092	0.058	0.181	0.231	0.238	0.326
Hexagonal	$\bar{X}$	−1.20	−0.57	−1.32	−2.19	−3.16	−4.26	−1.90	−1.15	−1.36	−2.40	−3.32	−4.15	−0.96	−0.64	−1.51	−2.10	−3.34	−4.38
Pattern of Dots (small)	σ	0.298	0.098	0.097	0.088	0.075	0.170	0.212	0.176	0.093	0.109	0.125	0.160	0.484	0.205	0.129	0.147	0.126	0.190
Blank	$\bar{X}$	−1.35	−1.09	−1.16	−1.44	−1.74	−2.03	−1.48	−1.33	−1.61	−1.74	−1.54	−1.71	−1.36	−1.76	−1.84	−1.90	−2.24	−1.82
White Wall (7'x7')	σ	0.197	0.143	0.182	0.174	0.284	0.244	0.200	0.250	0.208	0.230	0.217	0.131	0.289	0.209	0.204	0.246	0.448	0.240

TABLE III

MEAN AND STANDARD DEVIATION OF RESPONSES BY THREE OBSERVERS TO TARGETS OBSERVED MONOCULARLY THROUGH A SERIES OF LENSES AT A LOW LUMINANCE LEVEL

Target	Observer		CG						DK						MN					
	Lens Power		+1.00	0.00	−1.00	−2.00	−3.00	−4.00	+1.00	0.00	−1.00	−2.00	−3.00	−4.00	+1.00	0.00	−1.00	−2.00	−3.00	−4.00
	Red Pin	X	−0.70	−0.54	−1.04	−1.79	−2.83	−2.38	−1.40	−1.16	−1.42	−1.45	−1.38	−2.02	−1.24	−0.78	−0.76	−1.64	−3.04	−3.62
		σ	0.209	0.160	0.214	0.258	0.316	0.644	0.108	0.120	0.108	0.135	0.134	0.355	0.238	0.108	0.151	0.190	0.250	0.186
	Snellen ($4\frac{1}{2}'$)	X	−0.72	−0.66	−0.96	−1.06	−1.98	−1.60	−1.08	−0.96	−1.30	−1.50	−1.19	−1.04	−1.08	−0.98	−1.52	−2.28	−2.68	−3.57
		σ	0.287	0.179	0.117	0.126	0.316	0.196	0.170	0.135	0.169	0.229	0.187	0.177	0.134	0.238	0.281	0.219	0.306	0.468
	"E" (20/20) Blank	X							−0.55	−0.92	−1.05	−1.24	−1.60	−1.73	−1.60	−1.28	−1.58	−2.12	−3.02	−2.90
	White Disc (2")	σ							0.122	0.116	0.207	0.137	0.120	0.146	0.259	0.216	0.204	0.206	0.296	0.211
	Hexagonal	X	−0.44	−0.32	−0.80	−0.82	−1.38	−1.36	−0.60	−0.50	−0.69	−1.06	−1.46	−1.66	−1.19	−1.08	−1.06	−1.66	−2.63	−2.92
		σ	0.320	0.199	0.413	0.251	0.357	0.206	0.162	0.168	0.115	0.252	0.250	0.246	0.392	0.202	0.163	0.161	0.245	0.293
	Pattern of Dots (small) Blank	X	−0.62	−1.02	−1.09	−1.65	−1.64	−1.61	−0.56	−0.61	−0.88	−0.76	−1.46	−1.58	−0.88	−1.12	−1.38	−1.88	−2.20	−2.44
	White Wall (7'x7')	σ	0.169	0.194	0.094	0.184	0.274	0.262	0.163	0.117	0.215	0.240	0.197	0.163	0.270	0.172	0.192	0.308	0.114	0.163

order of 0.25 to 0.50 diopters above the response value to zero stimulus to accommodation.[15*]

In Figure 1, two of the five targets indicate a response of over-accommodation for stimulus values up through —4.00 diopters, but, as stated, the absolute value of the response may be over-represented by the measuring instrument. What seems to be of greater importance is that there appears to be little variation in the accommodative response between stimulus values of —1.00 and —4.00 diopters for all targets except the blank wall. This is borne out by the reasonably close parallelism between the plot of the responses to each target and the dotted line. As for the blank wall, Figures 1 through 9 show that accommodative responses to this target through lenses of more minus than 1.00 diopter, fall considerably short of the stimulus values. A comparison of these nine figures will also show that there is little to choose among the remaining targets in so far as their ability to stimulate adequate accommodative responses is concerned.

What does show up clearly is the effect of the luminance level on accommodative response. In Figures 1 and 2, for instance, which represent responses under a high and moderate luminance level (between 60 and 250 foot-lamberts), all targets other than the wall elicit reasonably good accommodative responses. However, at the *low* luminance level (about 0.10 foot-lamberts), there is a marked under-accommodation to all stimulus values over —1.00 diopter, whatever the target used.

Figures 4, 5, and 6, which represent the responses of the second subject, are quite similar to those of the first observer. The only real

Fig. 1. Monocular responses of CG to a series of targets observed through a range of lens powers under high luminance.
Fig. 2. Monocular responses of CG to a series of targets observed through a range of lens powers under medium luminance.
Fig. 3. Monocular responses of CG to a series of targets observed through a range of lens powers under low luminance.
Fig. 4. Monocular responses of DK to a series of targets observed through a range of lens powers under high luminance.
Fig. 5. Monocular responses of DK to a series of targets observed through a range of lens powers under medium luminance.
Fig. 6. Monocular responses of DK to a series of targets observed through a range of lens powers under low luminance.
Fig. 7. Monocular responses of MN to a series of targest observed through a range of lens powers under high luminance.
Fig. 8. Monocular responses of MN to a series of targets observed through a range of lens powers under medium luminance.
Fig. 9. Monocular responses of MN to a series of targets observed through a range of lens powers under low luminance.

*See note, page 42.

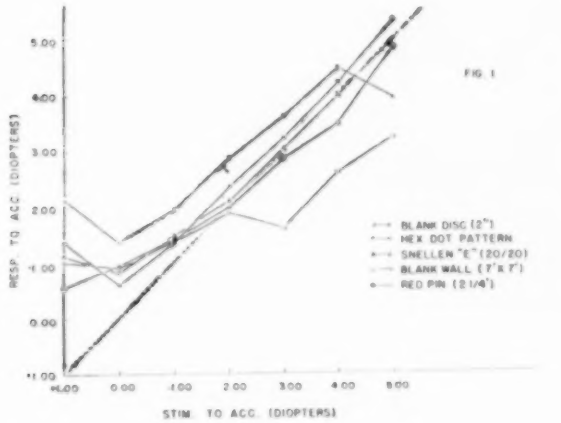

FIG. 1

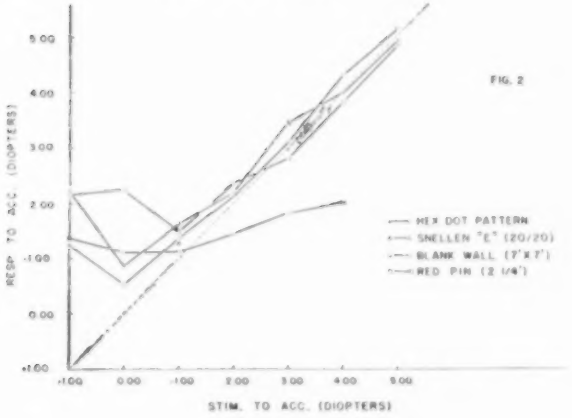

FIG. 2

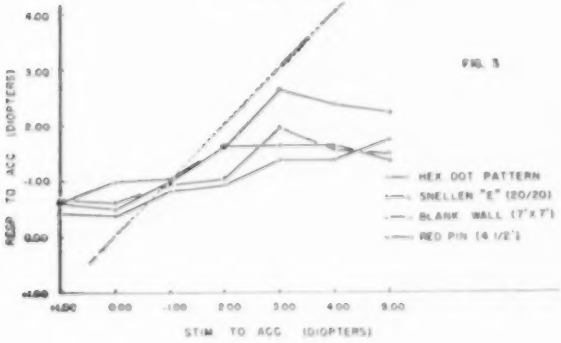

FIG. 3

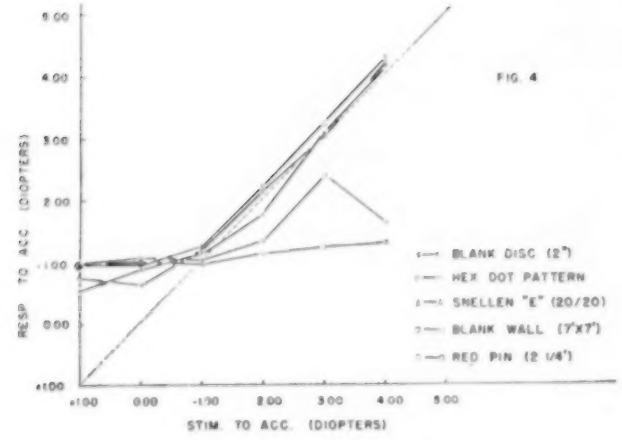

FIG. 4

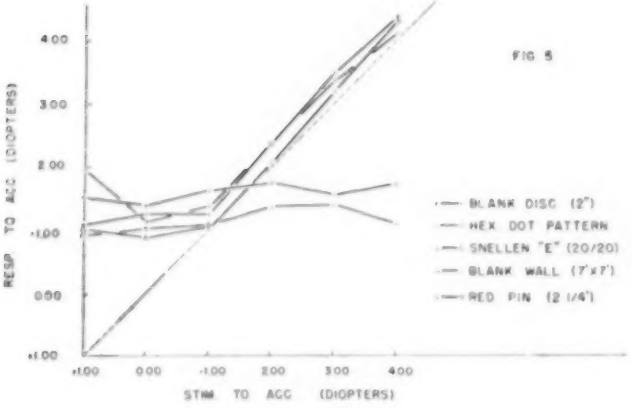

FIG. 5

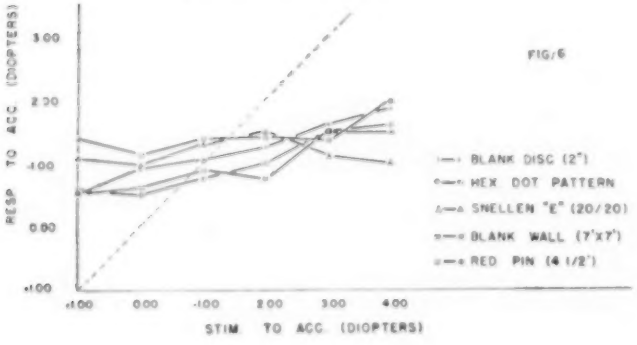

FIG. 6

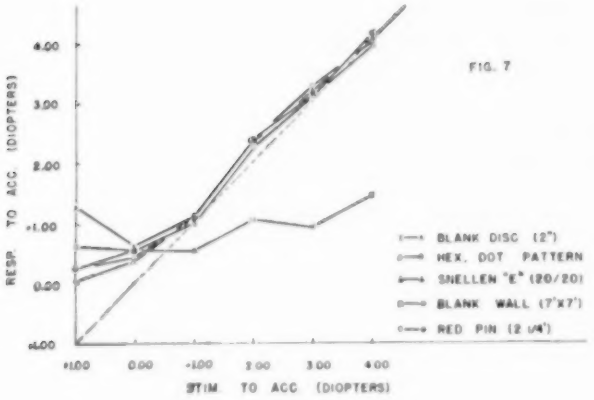

FIG. 7

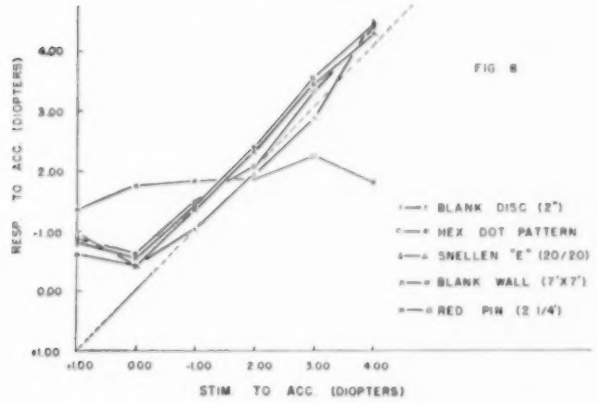

FIG. 8

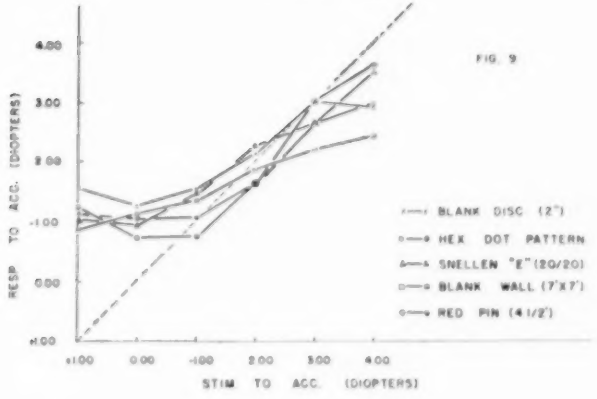

FIG. 9

difference seems to be that a red pin, subtending an angle a 2'15" at the nodal point of the eye, is about as feeble as the blank wall in evoking adequate accommodative responses through minus lenses greater than 1.00 diopter.

Figures 7, 8, and 9, representing the responses of the third subject, again reveal trends closely akin to those shown by the first two. The flattening out of the curve at a low luminance level is less pronounced for this observer, but otherwise the results again demonstrate a marked under-accommodation with strong stimuli at a low luminance level. The pronounced flattening of the curve at this level in the case of the other two observers seems to suggest that there is little difference in the accommodative response whether the stimulus be a —4.00 or a +1.00 diopter lens.

Since the primary purpose of this phase of the study was to arrive at a selection of the "best" and "poorest" targets in stimulating accommodation, the data were further analyzed for two items of information:

1. The degree to which the measured response corresponded to the magnitude of the lens power representing the stimulus to accommodation;
2. The reliability of the responses, as determined from the standard deviation.

The first criterion was evaluated statistically on the basis of the coefficient of concordance.[16, 17] By this means the attempt was made to determine whether one target was consistently superior in promoting the best agreement between the stimulus and response magnitudes. This consistency was appraised in terms of the harmony of responses of each observer at all three luminance levels, and of all three observers at each level and at all three levels of luminance.

Table IV shows that, from the responses of all three observers for the three brightnesses, it was not possible to rate one target as superior to the others in producing a proper accommodative response. From Table V one can draw the same conclusion with reference to the responses of each observer individually.

From the foregoing analysis, about the best that can be said is that, at the high and medium luminance levels, there was some indication that the Snellen "E" rated as the "best" target, but at the low level a pin (subtending a 4'30" angle at the nodal point) was the better target. It is possible that the "E" might have been better at the low luminance level had a size larger than 20/40 been used. More will be said about the size factor shortly.

The criterion of the reliability of the targets was based upon the variability in response occasioned by each. In order to evaluate this characteristic, analysis of variance was employed.[18] In this manner, since accommodative response was tested simultaneously with lenses and targets, it was possible to determine how much variation in response was due to the lenses, how much to the targets, and how much to the interaction between targets and lenses.

In Tables VI, VII, and VIII is summarized the variance induced by the targets and lenses separately and combined, for monocular data provided by the three observers at three luminance levels. Table VI shows that, at the highest level, both the targets and lenses independently affect the accommodative responses significantly, and that, for two of the three observers, the target-lens combination is also a significant factor. Table VII reveals that, at a medium luminance level, lenses and target-lens interaction both affect the accommodative responses of all three observers in a significant manner, while the targets are undoubtedly significant in this respect for two of the three observers, but on the borderline of statistical significance for the third (MN). For the latter observer, this suggests that the lenses are more important than the targets, and this is even more clearly shown in Table VIII, where the effect of targets is still on the borderline of statistical significance, and the target-lens interaction is *not* a significant factor. As before, the targets, lenses, and their interaction, all significantly influence the variations in accommodation of the remaining subjects. It may be concluded, therefore, that for one of the three observers, the nature of the target employed is not an important determinant of the accommodative response at reduced levels of luminance.

TABLE IV

Coefficient of Concordance for the Pooled Responses of Three Observers to Four Targets at Three Levels of Luminance

	Illumination Level		
	High	Medium	Low
Coefficient of Concordance	0.244	0.644	0.600
Probability[1]	$> .05$	$> .05$	$> .05$

[1]Values of P in Tables IV through VIII obtained from G. W. Snedecor, *Statistical Methods* (Ames, Iowa: The Iowa State College Press, 1946), Table 10.7, pp. 222-25.

TABLE V

Coefficient of Concordance for the Responses of Each of Three Observers to Four Targets at Three Levels of Luminance

Observer	Coefficient of Concordance for Three Illumination Levels	Probability
MN	0.266	$> .05$
DK	0.365	$> .05$
CG	0.055	$> .05$

TABLE VI
Analysis of Variance of Monocular Accommodative Responses by Three Observers For High Level of Luminance

Observer		MN			DK			CG	
Source of Variation	df*	F**	P‡	df	F	P	df	F	P
Targets	5	27.66	< .01	5	36.29	< .01	4	6.41	< .01
Lenses	4	9.96	< .01	4	44.38	< .01	4	6.79	< .01
Interaction of Targets and Lenses	20	3.47	< .01	20	9.85	< .01	16	0.78	> .05

*df = degrees of freedom; **F = ratio; ‡P = probability.

TABLE VII
Analysis of Variance of Monocular Accommodative Responses by Three Observers For Medium Level of Luminance

Observer		MN			DK			CG	
Source of Variation	df	F	P	df	F	P	df	F	P
Targets	5	2.44	.05	5	28.35	< .01	3	9.59	< .01
Lenses	4	6.74	< .01	4	55.15	< .01	4	14.13	< .01
Interaction of Targets and Lenses	20	3.73	< .01	20	7.63	< .01	12	2.55	= .01

TABLE VIII
Analysis of Variance of Monocular Accommodative Responses by Three Observers For Low Level of Luminance

Observer		MN			DK			CG	
Source of Variation	df	F	P	df	F	P	df	F	P
Targets	7	2.06	.05	6	13.92	< .01	3	11.90	< .01
Lenses	4	36.73	< .01	4	445.12	< .01	4	108.24	< .01
Interaction of Targets and Lenses	28	0.94	> .05	24	1.73	= .02	12	2.23	= .01

The significant change in accommodative response at all luminance levels with the variation in lens power applied requires a word of explanation. Since it is evident that (for example) a —2.00 diopter lens will not ordinarily elicit the same amount of accommodative response as a —3.00 diopter lens, absolute responses cannot be compared. Instead, what were compared were the magnitudes of the discrepancies between the response and corresponding stimulus value for each lens applied when the several targets were each viewed at a given level of luminance. Ideally, of course, these values should all be zero, and the degree of departure from this value was the measure of the discrepancy. It was to the discrepancy data that variance analysis was applied.

From the fact that variations in accommodative response were *always* significantly associated with lens changes, but *not* in all cases with target type, it would apppear that the lenses induce some part of these fluctuations as well as (or perhaps rather than) measuring them.

For one observer at a low luminance level it seems as if the lenses are responsible for practically all of the variation in response. The fact that target type is significant in changing responses of two of the observers but not of the third raises the question as to whether there may be several varieties of "night myopia"—one, a function of the luminance level, the other, a function of fixation stimulus. The function of luminance as a determinant of target effect is a problem which deserves futher intensive investigation.[19*]

Evaluation of the relative adequacy of the targets in promoting consistent responses was pursued at further length by obtaining the F ratio of the variance induced by pairs of targets successively, and so determining whether the differences in variability occasioned by the targets were significant. By utilizing the significant F ratios obtained by comparing each target with every other target, it was possible to rate the "best" and "poorest" targets in terms of the variability induced by each in the accommodative responses. When this was done, a long black thread, stretching from ceiling to floor, was found to induce the least variability, and the blank white wall (7 feet wide and 7 feet high) to evoke the most variability in the monocular accommodative responses of the three observers under the three luminance levels. The Snellen "E" rated about the second best of the targets in promoting consistency of response, and might have ranked first, had a larger size been used at the lowest luminance level.

A similar attempt was made to use F ratios between pairs of targets rated for their ability to promote agreement between the accommodative stimulus and response magnitudes, and so arrive at a "best" and "poorest" rating. The results here were inconclusive, although, again, the "E" appeared to be about as good as any target. A statistically meaningful rating, however, was not possible. Because of this, and also because (as was noted) the coefficient of concordance was so low for all three observers, both individually and collectively, no statistically permissible ranking could be made for stimulus-response agreement promoted by the targets based upon concurrence of responses by the three observers.

In sum, there is no clear-cut, objective (statistical) basis for evaluating the efficacy of the targets on the basis of the extent of the accommodative stimulus-response agreement each promotes. It is suggested that the Snellen "E" is as satisfactory as any of the targets considered. However, from the variance analysis of the variability in response occasioned by each target, it is fairly certain that a large wall,

*See note, page 42.

devoid of any markings and homogeneous in texture, brings about the most variability in response and also the least accommodation, and so may be considered the "poorest" target. On the basis of these findings, it was decided to use the Snellen "E" and the blank wall as the "best" and "poorest" targets, respectively.

One further problem was considered in this stage of the study. It was pointed out that, in all cases, there was an *over*-accommodation through low-power minus and plus lenses. (See Figures 1 through 9). The question arose as to whether different-size targets might not exert a differential effect on the accommodative response, and whether there might not be some optimum combination of given size target and given power plus lens to induce the maximum relaxation of accommodation, with consequently the best agreement between the response and stimulus values.

To answer this question, a series of Snellen "E" letters was constructed in the following sizes: 20/20, 20/40, 20/60, 20/80, 20/160. Each of these was observed monocularly by one observer with the successive application of +1.00, +0.75, +0.50, +0.25 diopter lenses, and no lenses before the eye. The luminance level was relatively high—120 foot-lamberts. Twenty readings in each case were made by means of the modified stigmatoscope.

The results are shown graphically in Figure 10. Inspection of the

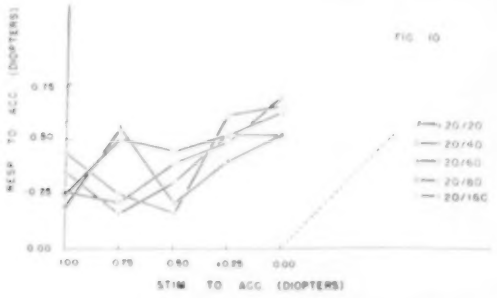

Fig. 10. Relationship of accommodative response by one observer to lens power (stim. value) for varying size of target (lum. level: 120 ft. lamb.).

graph indicates no consistently better response to different stimulus values with a particular size of the target. Unfortunately, time has not permitted a more intensive statistical analysis to be made of the data. In particular, variance analysis should be undertaken to determine the degree to which changes in response are due to target size alone, which to lens power alone, and which to a combination of the two. Further-

more, the same experimental procedure should be repeated at lower levels of luminance because of the strong possibility that the same targets do *not* have the same effects under different luminance levels. What these effects are, and the relationship between size, contrast, and luminance level, are problems which merit further careful analysis.[20*]

SUMMARY

No extensive summary is offered here, since this will await the report concerning the second phase of this two-part investigation. In brief, it may be said that, in the preliminary stage of the project, three observers viewed six arbitrarily-selected targets through a number of lenses under a high, medium, and low level of luminance. The responses were analyzed by the coefficient of concordance to determine whether each target promoted similar responses within and between observers under the several testing conditions. This was done to determine whether any targets gave consistently better agreement between the magnitude of the accommodative response to that target and the magnitude of the stimulus represented by the lens power through which the target was observed.

The responses were also tested by the method of analysis of variance to determine which target occasioned the most, and which the least fluctuation in the observers' responses. On the basis of these two analyses, the Snellen "E" was judged to be the most effective and the blank wall the least effective in promoting adequate accommodative responses.

It was further suggested that the factors of target size and the contrast between the luminances of object and background are of great importance and their influence cannot be neglected in a definitive study of nocturnal and sky myopia.†

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OCULAR PATHOLOGY AND INTERPROFESSIONAL RELATIONS

In a recent newsletter, a group of dispensing opticians imply that optometry desires to go beyond its professional boundaries and is encroaching upon the confines of medical practice. To support these implications they have reprinted and circulated an announcement that two courses totaling six hours would be offered on glaucoma at the annual meeting of the American Academy of Optometry.

In order to evaluate the merit of this point of view, we must ask ourselves what optometry's position should be with regard to such diseases as glaucoma. We believe the following:

(a) Glaucoma is a leading cause of adult blindness today.

(b) A substantial segment of the American people has chosen

and will continue to choose the optometrist as its general practitioner in the field of vision and eye care.

(c) The optometrist, realizing the responsibility which public confidence in him demands, must do all in his power to recognize as early as possible the presence of such disorders.

(d) Having demonstrated that glaucoma might be suspected, the optometrist will then refer the patient to an ophthalmologist. He will expect the ophthalmologist to confirm or reject his tentative diagnosis. If it is confirmed, he will assume that the ophthalmologist will institute medical or surgical treatment so that as much of the patient's vision as possible may be saved.

(e) In order to recognize glaucoma, the optometrist must have as much knowledge of this disease as possible. He must know the prognosis, for he must be able to impress upon the patient the importance of accepting the referral. Only those who practice optometry can fully appreciate how difficult it frequently is to convince a patient that he must undergo ophthalmological consultation. The optometrist must fully understand the etiology of the disease for the help it will give him in discovering glaucoma as early as possible. The optometrist must understand, in a general way, the treatment so that he may urge his patients to follow the ophthalmologist's prescribed therapy. More than once in our own practice we have had to stress upon a careless patient the necessity of taking his medication exactly in the fashion which the ophthalmologist recommended.

(f) Knowledge about glaucoma on the part of the optometrist is in the public's best interest. The optometrist serves no selfish need in obtaining this information: it does not augment his income: he is doing so to help save patients from blindness. His seeking of knowledge in this and allied fields is a thing of which his profession may justly be proud.

In a general way, the content of this newsletter, written by these dispensing opticians, has the effect of clearing the air, for it reveals with unmistakable clarity the role which certain dispensing opticians have chosen to play in the field of interprofessional relations, a role earlier described by Koch* as that of mischief-maker. These opticians are, seemingly, unable to comprehend that optometry's only aim in glaucoma detection, is an altruistic one and solely in the patient's best interest. That these dispensing opticians have been fomenting trouble between the two professions which share the public's confidence for the

*Carel C. Koch. Results of Mischief Making in the Eye Field. Am. J. Optom. & Arch. Am. Acad. Optom. 32: 4: 216-217, 1955.

care of vision now becomes only too clear. Due to the work of the mischief-makers, interprofessional relations are at present strained. Can anyone say that this is in the public's best interest?

In passing, it is amusing to ask "where are the woes of yesteryear?" It seems only a short time ago that optometrists were accused of being unable to recognize pathology. Now they are accused of encroaching upon medicine by knowing too much about pathology. Yet, at no time has any accredited optometric spokesman suggested that optometrists do anything with their knowledge of pathology other than to refer for ophthalmological care.

Finally, optometry's projected course should be touched upon briefly. To act in the public's best interest, the optometrist can follow only one course. He must continue to learn as much as he can about glaucoma and other similar pathological states. He must continue to make every possible attempt to recognize the earliest manifestations of conditions which may threaten his patient's vision. He must continue to refer to the ophthalmologist those patients who will benefit by this procedure. He is far more secure, standing in a profession accused of trying to learn too much than in one accused of not knowing enough.

Finally, optometrists may hope for and work toward the cooperation and respect of their ophthalmological colleagues. Personally, we feel confident that the motives of the mischief-makers will ultimately become clear. As truth will out, actions not in the public interest will be discovered and condemned. As long as optometry continues to act in the public's best interest, our future is assured.

MONROE J. HIRSCH

TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

PRESIDENT'S ANNUAL REPORT*

John D. Perry, Jr.†
Winston-Salem, North Carolina

It is a pleasure to welcome you to the 35th annual meeting of the American Academy of Optometry. Your presence and interest is an

*Read before the annual meeting of the American Academy of Optometry, first general business session, December 10, 1955, Chicago, Illinois. For publication in the January, 1956, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

†Optometrist, Fellow, American Academy of Optometry.

inspiration to those of us who have served you this year, and it is gratifying that so many of you have come to take advantage of the educational aspects of the Academy: to enjoy the fellowship of Academy members, and to learn of the accomplishments of the Academy during the past year, and its aims for the coming year.

It has been a privilege for me to serve as your President this year. This is the third time I have been in the Chicago area, recently, in the interest of the Academy. In July, Dr. Koch and I attended the 58th Annual Congress of the American Optometric Association in Milwaukee, along with two members of the Executive Council and approximately 100 Academy members. This large representation demonstrates that our Academy members, in these United States, are living up to the spirit of favoring the closest possible association with the American Optometric Association. Our members are attending Academy meetings, and are also assuming the leadership in a good many phases of the work of the A.O.A., which is as it should be. We feel that in this respect, the Academy is fulfilling its purpose satisfactorily. May I urge every Fellow of the Academy to lend his talents to both his local, State and Provincial Optometric Associations, and always be willing to give his full support to those organizations working along legislative and economic lines.

On October 12th, I attended the quarterly meeting of the Board of Directors of The Better Vision Institute, which was held here in Chicago. The President of the Academy is elected an honorary director of The Better Vision Institute, during his term in office, and it is desirable that he attend these worthwhile meetings.

The Academy is essentially an educational organization. We have just passed a milestone in making this society a great source of Post-Graduate training. I refer to the Post-Graduate Courses that have just preceded this meeting. I take pride in reporting to you that optometrists attended these courses in great numbers from 22 States and three Provinces of Canada. More than 2,400 hours of clinical instruction were provided for these men. Next year greater plans are in store. At this time I wish to congratulate the Committee on Post-Graduate Courses, Dr. V. J. Ellerbrock, chairman, and Dr. Harold Fisher and Dr. Gerald Westheimer. This group arranged the courses and brought together the fine group of Instructors who have made the past three days and evenings such an outstanding success. To each of the Instructors goes my sincere appreciation for the splendid job, well done indeed. The planning of these courses has been going on for the past two years and the excellent program of Post-Graduate instruction we have just completed is evidence that the time spent on this activity was well

spent. We are deeply indebted to this Committee for a most successful session, and we already know what a treat is in store for us at our 1956 meeting in Houston, Texas, as the Committee and most of the Instructors have again consented to repeat and expand the work which will then be given there.

I also wish to express my appreciation for the Committee that handled the administrative work connected with the registration for the Post-Graduate Courses. This committee, Dr. D. G. Hummel, chairman, Dr. M. H. Kauhl and Dr. R. Ehrenberg also showed fine team spirit and discharged their work in fine shape. I am pleased to report to you that they, too, will continue their activities in 1956.

We are proud of the accomplishments of the Academy this year. The Vice-President, Dr. R. W. Tubesing, and every member of the Executive Council has cooperated to the fullest extent in carrying out their many duties and it is with particular pride that I ackowledge briefly the work of other standing Committees.

To Dr. Kenneth B. Stoddard I wish to give recognition for the fine manner in which he has handled his duties as chairman of the Editorial Council, and for his fine cooperation with Editor Koch and has committee members. We are pleased to point out the influence the Academy has had in shaping the profession through its official publication, the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY. Each monthly edition might be called a refresher course in optometric science. Certainly, nowhere else can members of our profession keep themselves so well-informed on new developments in clinical and applied research, new scientific discoveries that affect us, and new techniques used by our profession. Particularly gratifying, is the fact that our publication is being read, studied and quoted more and more by others interested in visual science and refraction.

To our Committee on Admittance, Dr. Harold Simmerman, chairman, and his regional sub-committees, we are greatly indebted. This Committee has had a very busy year and carries one of the most difficult assignments in the organization. Unless this Committee functions smoothly the Academy will cease to grow. Their problems are many but, in the Committees friendly and diplomatic manner, they handle many delicate situations that do not show up in a routine report. For the magnificent job you all are doing, Dr. Simmerman and your workers, I want to say, "thank you" from an appreciative Academy.

The Committee on Chapters, Dr. Lawrence Fitch, chairman, has made problems with our Chapters few and far between, since this Committee has set up an outline of procedure under which Chapters may be

organized and under which they function well indeed. This standing Committee, too, has done an outstanding job during the past year.

Upon recommendation of the Research Projects Committee, Dr. Monroe J. Hirsch, chairman, the Executive Council voted, during the year, to make four grants-in-aid, totaling approximately $1,500.00. All four projects are already under way, and we will have reports on them from time to time. We regret that more money is not available each year, for distribution by this Committee.

We will soon hear from another Committee that has been hard at work for the past year. This is the Papers and Program Committee, under the chairmanship of Dr. J. Donald Kratz. This splendid committee has arranged a diversification of clinical and scientific papers, that will take the better part of the next four days to complete. Each of the five Section Chairmen have also arranged a top-flight program, and you can attend a Section meeting of your choice from 9:00 A.M. to 11:00 A.M. for the next three mornings.

One of the great Presidents of the United States, Theodore Roosevelt, once said, "Every man owes some of his time to the upbuilding of the profession to which he belongs." Those men who present technical papers, and the others who attend these meetings, are definitely contributing to their profession. It is through this exchange of ideas and discussion of our mutual problems, that the greatest good of our Academy is received; and, as a result, each of us can return to his practice, better prepared to carry out his duties as an optometrist.

Year after year, the activities of the Academy become more numerous, and there is an ever-increasing amount of work involved in carrying out the functions of the organization. Here, I wish to pay tribute to our efficient secretary, Dr. Carel C. Koch. The Academy program functions so smoothly, that we are sometimes apt to take it for granted, but, there would be many a hitch except for the able hand of Dr. Koch. Presidents come and go, executive councils and committee heads serve their appointed times, but behind them all, giving the advantage of his experience; smoothing the way; suggesting efficient means of meeting a problem; co-ordinating the work of the Committees; keeping his finger on the pulse of everything that affects the Academy, and molding and forming the Program that is the Academy, is our Secretary. Thank you, Carel. You have been a tremendous help to me this year.

1955 has been a great year for Optometry, and for the Academy. Today, we can feel justly proud of our achievements; proud but not complacent. Already, we must set our sights a little higher, and begin thinking—planning—and working toward a new goal in 1956, for that is the only road to progress.

REPORT OF CHICAGO ACADEMY MEETING

It was a great week in Chicago. The 35th annual meeting of the American Academy of Optometry, December 7-13, 1955, was one of the finest of many such meetings. The attendance was good, as 338 optometrists from 38 States and several Canadian Provinces attended the General Program and the specialized Section Meetings as well as the numerous Post-Graduate Courses. Academy officers received many compliments from members and guests on the excellence of the program and the efficiency which characterized the management of the week long event.

ACADEMY HONORS DR. ALBERT FITCH

One of the highlights of the meeting was the presentation of an Honorary Life Fellowship to Dr. Albert Fitch, president, Pennsylvania State College of Optometry, Philadelphia. The award was made by President Perry at the annual Round Table Dinner of the Academy. In making the award to Dr. Fitch, President Perry stressed the contributions made to optometry by Dr. Fitch, first in securing early optometric legislation and in defending such legislative acts in the courts and next for his outstanding work in founding, in 1918, the first independent non-profit College of Optometry, this being the Pennsylvania State College of Optometry.

Since its founding in 1918, Dr. Albert Fitch, with the aid of a Board of Trustees, has directed the affairs of the Pennsylvania State College of Optometry. During this period he has introduced many improvements in undergraduate professional education in optometry. The College organized one of the first free out-patient clinics; was chartered to grant one of the first Doctor of Optometry Degrees, and the first optometry College to require two years of pre-optometric undergraduate academic training and four years of undergraduate profressional training for the Degree. Volume I of an autobiography, "My Fifty Years in Optometry" by Dr. Albert Fitch has just been published. In his response to the presentation by President Perry, Dr. Fitch spoke on present day Interprofessional Relations.

The presentation of an Honorary Life Fellowship to Dr. Fitch was the seventh such presentation made by the Academy. Prior awards were presented to Dr. Frederick A. Woll,* former member of faculty, School of Optometry, Columbia University, New York City; Dr. Alpheus W. Smith, former Dean, Graduate School, The Ohio State University, Columbus, Ohio; Dr. James P. C. Southall, Charlotts

*Deceased.

From left to right, Dr. Albert Fitch, Dr. Carel C. Koch and Dr. John D. Perry, Jr., at presentation of Honorary Life Fellowship Award.

ville, Virginia, former member of faculty, School of Optometry, Columbia University, New York City; Dr. Julius Neumueller, Haddonfield New Jersey, member of faculty, Pennsylvania State College of Optometry; Dr. William L. Benedict, former Chief, Section on Ophthalmology, Mayo Clinic, Rochester, Minnesota, and Dr. Charles Sheard former professor of biophysics, the Mayo Foundation, University of Minnesota and, 1914-1919, director of applied optics (later School of Optometry), The Ohio State University, Columbus, Ohio.

ELECTION OF OFFICERS AND EXECUTIVE COUNCIL

During the business session on Monday afternoon the following members were elected Officers and members of the Executive Council for 1956. Dr. John D. Perry, Jr., Winston-Salem, North Carolina, president; Dr. R. W. Tubesing, Richmond, Indiana, vice-president; Dr. Carel C. Koch, Minneapolis, secretary-treasurer; Dr. Meredith W. Morgan, Jr., Berkeley, California, past-president; Dr. Lawrence Fitch, Philadelphia; Dr. J. Donald Kratz, Souderton, Pennsylvania; Dr. Donald A. Springer, Anniston, Alabama, and Dr. Ralph E. Wick, Rapid City, South Dakota. Dr. Harold Simmerman, Wenonah, New Jersey, chairman, Committee on Admittance will serve ex-officio as a member of the Executive Council of the Academy.

SECTION MEETINGS

The five Academy Sections each met on December 11, 12 and 13. Each Section meeting lasted two hours on each day. The purpose of these meetings is to bring together specialists who discuss mutual problems dealing with each specialty. The Section meetings are open to all members and guests. To a large degree the clinical side of optometric practice is stressed at these five Section meetings. The programs followed by the Sections at Chicago are preseented here for the first time.

ANISEIKONIC SECTION

Dr. Oscar L. McCulloch, Chairman, Holyoke, Massachusetts.

Sunday, December 11, 1955, 9:00 A.M. - 11:00 A.M.

Tribute to Dr. Adelbert Ames. Leo Madigan, O.D., Boston.

Recent Developments in the Field of Aniseikonia. Robert E. Bannon, O.D., Bureau of Visual Science, American Optical Company, Southbridge, Massachusetts.

Further Modifications in the Field of the Space Eikonometer Technique. Harold M. Fisher, O.D., New York City.

Monday, December 12, 1955, 9:00 A.M. - 11:00 A.M.

Panel Discussion: "Aniseikonia in Optometric Practice."

Practice Management, Economics, Techniques and Problems.

Reliability of Aniseikonia Measurements. Alfred Rosenbloom, Illinois College of Optometry, Chicago.

Tuesday, December 13, 1955, 9:00 A.M. - 11:00 A.M.

Round Table Discussion of Case Reports by Harold Fisher, O.D., New York City; Leo Madigan, O.D., Boston; Ray S. Martin, O.D., Puyallup, Washington; Max Schapero, O.D., Los Angeles; D. A. Springer, O.D., Anniston, Alabama; R. W. Tubesing, O.D., Richmond, Indiana; Ralph E. Wick, O.D., Rapid City, South Dakota; Arene T. Wray, O.D., Los Angeles and John Zettel, O.D., Cincinnati.

CONTACT LENS AND SUB-NORMAL VISION SECTION

Dr. Bernard Mazow, Chairman, Houston, Texas

Sunday, December 11, 1955, 9:00 A.M. - 11:00 A.M.

Aids for the Sub-normal Vision Patient, and, A Bifocal Microscope for the Partially Sighted Patient. William Policoff, O.D., Wilkes-Barre, Pennsylvania.

Monday, December 12, 1955, 9:00 A.M. - 11:00 A.M.

Two Years of Clinical Experience in Fitting Microlenses—A Statistical Report. John C. Neill, O.D., Philadelphia.

A Study of the Cornea. Norman Bier, F.B.O.A. (Hons) London, England.

Tuesday, December 13, 1955, 9:00 A.M. - 11:00 A.M.

The Application of Minimum Clearance Fenestrated Lenses to Keratoconus. Daniel Elliott, Jr., O.D., South Bend, Indiana.

The Results of Keratoconus Fitting. Newton K. Wesley, O.D., Chicago.

SECTION ON OCCUPATIONAL VISION

Dr. Herman Sager, Chairman, Sperry Gyroscope Company, Lake Success, New York.

Sunday, December 11, 1955, 9:00 A.M. - 11:00 A.M.

The Determination of Magnifications Used in Assembly and Inspection Operations. Arnold Langsen, O.D., Wright Aeronautical Company, New Jersey.

The Industrial Vision Program for Civilian Employees at Naval Installations. Commander Walter Campbell, U. S. Naval Shipyard, Brooklyn, N. Y.

Monday, December 12, 1955, 9:00 A.M. - 11:00 A.M.

The Industrial Vision Program at the Eastman Kodak Company. Gustave Strebal, O.D. Eastman Kodak Company, Rochester, New York.

A New Method of Testing Used by Industrial Insurance Companies to Ferret Out the Accident Prone. Edward Steinberg, O.D., New York City.

Tuesday, December 13, 1955 9:00 A.M. - 11:00 A.M.

The Placement of Monocular Applicant in Industry. Herman Sager, O.D., Sperry Gyroscope Company, Lake Success, New York.

Panel discussion led by Dr. Henry Peters, O.D., Oakland, California, on Relations of Prepaid Vision Programs (Union, Health & Welfare Contracts) to Occupational Vision Programs.

ORTHOPTIC SECTION

Dr. Paul L. Connolly, Chairman, Detroit, Michigan.

Sunday, December 11, 1955 9:00 A.M. - 11:00 A.M.

Treatment and Results with Strabismic Patients. John Zettel, Jr., O.D., Cincinnati, Ohio.

A Concept Concerning Anomalous Correspondence. Daniel J. Woolf, O.D., Ph.D., New York City.

Report on Orthoptic Education in Schools and Colleges of Optometry. Ralph H. Green, O.D., Massachusetts College of Optometry, Boston; Gordon G. Heath, O.D., Division of Optometry, Indiana University, Bloomington, Indiana, and Glenn A. Fry, O.D., Ph.D., School of Optometry, The Ohio State University, Columbus.

Monday, December 12, 1955 9:00 A.M. - 11:00 A.M.

Visual Field Control with Nasal Occluders; A Simple Method of Bar Occlusion; Accommodative Rock and the Use of Red and Green or Polaroid Filters with the Engelmann Trial Frame, and Subjective Determination of Pupillary and Bifocal Measurements. O. R. Engelmann, O.D., Chicago.

The Relationship of Optokinetic Nystagmus to the Practice of Orthoptics. W. P. Schumann, O.D., Vineland, New Jersey.

Non Presbyopic Application of the Bifocal. Salvi S. Grupposo, O.D., Bureau of Visual Science, American Optical Company, Southbridge, Massachusetts.

Tuesday, December 13, 1955 9:00 A.M. - 11:00 A.M.

Designing the Chieroscopic Target for the Visual Problem. Leo Manas, O.D., Illinois College of Optometry, Chicago.

Report on Orthoptic Education in the Schools and Colleges of Optometry. M. E. Broom, O.D., Southern College of Optometry; Leo Manas, O.D., Illinois College of Optometry, Chicago, and J. Donald Kratz, O.D., Pennsylvania State College of Optometry, Philadelphia.

SECTION ON PATHOLOGY

Dr. Monroe J. Hirsch, Chairman, Ojai, California

Sunday, December 11, 1955 9:00 A.M. - 11:00 A.M.

Myesthenia Gravis and Some Ocular Implications. Otto J. Bebber, O.D., Denver, Colorado.

The Effect of Oxygen on the Retinal Vessels and Its Relationship to Retrolental Fibroplasia. Kenneth B. Stoddard, O.D., Ph.D., School of Optometry, University of California, Berkeley.

The Fundus in Glaucoma. John Thompson, M.D., South Bend, Indiana.

Monday, December 12, 1955 9:00 A.M. - 11:00 A.M.

Annual Fundus Slide Presentation. Harold Simmerman, O.D., Pennsylvania State College of Optometry, Philadelphia.

Tonography, a Brief Review. Kenneth B. Stoddard, O.D., Ph.D., School of Optometry, University of California, Berkeley.

Tuesday, December 13, 1955 9:00 A.M. - 11:00 A.M.

Interprofessional Relations. Carel C. Koch, O.D., Minneapolis.

Basal Metabolism in Retinal Detachment. Review of Paper by Frances H. Cook, M. N. Nelson, O.D., Blue Earth, Minnesota.

The Harrington-Flocks Flash Screener. Demonstration and Discussion. Monroe J. Hirsch, O.D., Ph.D., Ojai, California.

ACADEMY POST-GRADUATE COURSES

The 35th annual convention of the Academy saw the start of a new Academy educational program in the form of 40 post-graduate

courses that were offered to all optometrists on December 7, 8 and 9. The top enrollmeent in each of these courses was limited to 30 optometrists. The courses varied in length from one to 12 class hours of instruction. The subjects offered were in large part, basic clinical material and the Instructors were leading practitioners and educators, each selected for his knowledge of the subject and his ability to teach.

The courses were so well attended and received that the Committee under the joint chairmenship of Dr. V. J. Ellerbrock, School of Optometry, The Ohio State University, Columbus, and Dr. D. G. Hummel, Cleveland, are already at work arranging the new group of courses which will be given in December, 1956, at Houston, Texas. The complete roster of Instructors and the list of courses given by them at Chicago appeared in a prior issue of this Journal.[1] It is interesting to note that advance registration accounted for more than two-thirds of the optometrists attending the post-graduate courses.

GENERAL MEETINGS OF THE ACADEMY

During the General Meetings of the Academy, December 10, 11, 12 and 13, a large number of original papers were presented and discussed. This portion of the program was directed by the Papers and Program Committee, Dr. J. Donald Kratz, chairman, Souderton, Pennsylvania. These original papers dealt with a great variety of subjects[2] each of interest and of value to optometrists. Most of these papers will be presented in this Journal in coming months. Those who presented original papers at the General Meetings were:

A. R. Lauer, Ph.D., Iowa State College, Ames, Iowa; John Oliver, Ph.D., Iowa State College, Ames, Iowa; David D. Michaels, M.S., O.D., Illinois College of Optometry, Chicago; Lt. Phillip R. Haynes, U. S. Army Hospital, Fort Jackson, South Carolina; Frederick Sinn, O.D., Pennsylvania State College of Optometry, Philadelphia; Merrill J. Allen, O.D., Ph.D., Division of Optometry, Indiana University, Bloomington; Gerald Westheimer, O.D., Ph.D., School of Optometry, The Ohio State University, Columbus; Fred W. Jobe, D.O.S., Director, Ophthalmic Research and Development, Bausch & Lomb Optical Co., Rochester; Robert E. Bannon, O.D., Bureau of Visual Science, American Optical Company, Southbridge.

Harold M. Fisher, O.D., New York City; Darrell B. Carter, M.S., O.D., College of Optometry, University of Houston, Houston; Alfred Rosenbloom, M.A., O.D., Illinois College of Optometry, Chicago; Arthur Shlaifer, O.D., Pennsylvania State College of Optometry, Philadelphia; Henry L. Wolfe, O.D., Wolfe Eye Clinic, Marshalltown, Iowa; Vernon Ryan, O.D., F.S.M.C. (London) Pennsylvania State College of Optometry, Philadelphia; Walter N. Tyszkowski, B.S., M.S., Massachusetts College of Optometry, Boston; J. K. Davis, A.B., Research Center, American Optical Company, Southbridge; Gilbert Clotar, M.S., Research Center, American Optical Company, Southbridge; John C. Neill, O.D., Pennsylvania State College of Optometry, Philadelphia.

Hollis M. Leverett, Ph.D., Research Department, American Optical Company.

[1]V. J. Ellerbrock and D. G. Hummel, Academy Post-Graduate Courses, Am. J. Optom. & Arch. Am. Acad. Optom. 32, 9, 499-506, 1955.

[2]Carel C. Koch, Academy Convention and Program, Am. J. Optom. & Arch. Am. Acad. Optom. 32, 11, 616-620, 1955.

Southbridge; Bernard Vodnoy, O.D., South Bend, Indiana; Frederick W. Hebbard, M.S., O.D., School of Optometry, University of California, Berkeley; Ralph E. Wick, O.D., Rapid City, South Dakota; R. J. Wixon, O.D., Shamokin, Pennsylvania; Charles S. Bridgman, O.D., Ph.D., Bureau of Industrial Psychology, University of Wisconsin, Madison; Jack Prince, F.S.M.C., Department of Ophthalmology, Medical School, The Ohio State University, Columbus; Glenn A. Fry, O.D., Ph.D., School of Optometry, The Ohio State University, Columbus; Robert C. Granam, B.Sc., O.D., Pasadena, California; Margaret S. Dowaliby, O.D., Los Angeles College of Optometry, Los Angeles.

ANNUAL ROUND TABLE DINNER

Along with Dr. Perry and Dr. Fitch at the head table at the annual Round Table Dinner, Monday evening, December 12 in the Gold Room at the Drake were Dr. Norman B. Hays, Niagara Falls, New York, president of the American Optometric Association; Dr. Henry W. Hofstetter, Director, Division of Optometry, Indiana University, and president of the Association of Schools and Colleges of Optometry; Dr. Harold M. Fisher, New York City, president, National Board of Examiners in Optometry; Dr. William Greenspon, Bluefield, West Virginia, chairman, Council on Optometric Education of the American Optometric Association, and Dr. Harold Simmerman, Wenonah, New Jersey, chairman, Committee on Admittance, of the Academy. All are members of the Academy.

Dr. Norman B. Hays spoke of the present activities of the A.O.A. and emphasized the need for vigorous and conservative action in advancing the many important programs of the profession. He also brought the greetings of the official family of the A.O.A. to all Academy members and invited them all to attend the next annual Congress of the A.O.A. at Miami, Florida, next June.

Dr. Hofstetter and Dr. Fisher presented the greetings of their organizations to the Academy and Dr. Greenspon reviewed briefly the current work of the official educational accrediting agency in optometry and its relations with similar agencies serving other professional groups.

At this point Dr. Perry brought forward Dr. Bernard Mazow, Houston, chairman, Academy Contact Lens and Sub-Normal Vision Section. Dr. Mazow, on behalf of the Section then presented the special Contact Lens Certificate awarded only to those optometrists who had completed the difficult Academy educational requirements for Certification as a Contact Lens Specialist. This Certificate was received by Dr. Daniel O. Elliott, Jr., South Bend, Indiana, who has, during the past two years completed the necessary work to become a Contact Lens Specialist, certified by the Academy. The annual Academy Roster to be published in the February, 1956, issue of this Journal will list all Academy members who have received Certification as Contact Lens Specialists.

Dr. Harold Simmerman then introduced a group of Academy applicants who had successfully completed their work and who were newly elected Fellows of the Academy.

NEW MEMBERS

Dr. E. F. Attridge, R.O., 2955-A Dundas St. W., Toronto, Ontario.

Dr. A. H. Borland, 324 Temple Bldg., New Castle, Pennsylvania.

Dr. Roger G. Boyd, 220 W. Main St., Fairborn, Ohio.

Dr. Harold R. Bryan, 28 S. Main St., Gloversville, New York.

Dr. Robert L. Coleman, 236 East Second St., Tifton, Georgia.

Dr. Russell L. Dorland, National Citizens Bank Bldg., Mankato, Minnesota.

Dr. William John Ebauer, 926 Light St., Baltimore, Maryland.

Dr. Paul E. Grattan, 50 Broad St., Waterford, New York.

Lt. Jerome A. Hirsch, Aero Medical Laboratory, Wright Patterson AFB., Dayton, Ohio.

Dr. Kenneth A. Hoose, Getz Block, Kent, Ohio.

Dr. Ralph M. Howard, 32 West Van Buren, Battle Creek, Michigan.

Dr. A. A. Hubal, 406 Union St., Schenectady, New York.

Dr. M. L. Knutson, 5 West State St., Mason City, Iowa.

Dr. J. A. Lane, Newcastle, Wyoming.

Dr. Ruth Macdonald, Gas City, Indiana.

Dr. Charles A. Machacek, 3542 W. 26th St., Chicago, Illinois.

Lt. Comdr. John E. Milloy, MSC., U.S.N.R., U. S. Naval Hospital, Camp Lejeune, Jacksonville, North Carolina.

Dr. Leslie Mintz, 71 Market St., Passaic, New Jersey.

Dr. Clarence W. Morris, 2409 South Calhoun St., Fort Wayne, Indiana.

Dr. H. L. Moss, 115 Main St., Woodbridge, New Jersey.

Dr. William F. Nelson, 222 Brett Bldg., Mankato, Minnesota.

Dr. Mark Pomerantz, Sinton, Texas.

Dr. Ramona Porter, Oakley Bldg., Bardstown, Kentucky.

Dr. Frederic M. Rosemore, James St., Fayette, Alabama.

Dr. Joseph M. Roth, 1839 Palmer Ave., Larchmont, New York.

Dr. Robert F. Scherzinger, Van Hoff Bldg., Little Chute, Wisconsin.

Dr. Robert C. Sneller, 227 N. Denver Ave., Hastings, Nebraska.

Dr. Irving J. Suttin, 114 E. Main St., Carnegie, Pennsylvania.

Dr. H. Edward Welton, 2587 East 55th St., Cleveland, Ohio.

Dr. E. Gerald Wilhite, 1023 15th St., Bedford, Indiana.

Dr. C. Edward Williams, 612 Empire Bldg., Denver, Colorado.

Dr. Jean Zerbe, 708 Park Ave., New York, New York.

Dr. Norman A. Zevin, 1924 Main St., Northampton, Pennsylvania.

MEMBERS VISIT ILLINOIS COLLEGE OF OPTOMETRY

On Sunday, December 11, following the Section Meetings, a group of members drove to the Illinois Tech campus for dinner in the Commons Building. The Academy delegation then visited the buildings occupied by Illinois College of Optometry. Here they were welcomed by Dr. Glenn H. Moore, Dr. Eugene W. Strawn, Dr. Morton Abram and Dr. Richard Feinberg along with many of the I.C.O. faculty.

THE EXECUTIVE COUNCIL

During the week in Chicago the Executive Council was in special session for 32 clock hours. Much of this time was devoted to routine Academy business and questions regarding membership and reviewing qualifications of applicants. One problem that was before the Council however, required many hours of conference during which a large number of members presented their views and opinions. This question had to do with the teaching and training of technicians by Academy members. As the result of these deliberations the following statement of Policy was drafted and approved.

> "Training Technicians — Statement of Academy Policy. The Executive Council of the American Academy of Optometry has considered the teaching of professional and technical procedures by Academy members to non-professional personnel. The Council recognizes the democratic principle of freedom in the pursuit of truth and knowledge and wants to avoid any interference with this principle as its applies to the members of the Academy. However, the Council also recognizes the principle that the welfare of the public is the primary concern of our profession. It is possible that actions of Academy members cannot be guided simultaneously by both of these principles. As these principles relate to Academy members teaching non-professional personnel, the Council urges members to use every care that such students have sufficient preliminary education and be subject to adequate professional supervision so as their knowledge of professional procedures does not endanger the welfare of the public."

1956 AND 1957 CONVENTION CITIES

A prior action of the Academy had approved Houston, Texas as the 1956 convention city, and Chicago, Illinois as the 1957 convention city.

1958 MEETING

On the recommendation of the Time and Place Committee, Dr. Ralph E. Wick, Rapid City, South Dakota, chairman, Boston, Massachusetts was selected as the 1958 convention city and the Statler Hotel as the convention hotel.

At the time this decision was made the discussion turned to the Pacific Coast as the choice for the 1960 annual convention. An invitation was presented to have the 1960 meeting in San Francisco. This will be considered at the 1957 convention.

TERRY JUDITH PARKINS

BOOK REVIEW

REHABILITATION OF A CHILD'S EYES. Richard G. Scobee, M.D., F.A.C.S. and Herbert M. Katzin, M.D., F.A.C.S. Published by the C. V. Mosby Company, St. Louis, Mo., 133 pages. (Second Edition) $2.85. 1955.

The late Dr. Richard Scobee, assistant professor of opthalmology at Washington University, School of Medicine, wrote the first edition of this book for the information of parents of children with crossed eyes. Its purpose is to explain simply and clearly some of the common questions parents naturally ask when their child undergoes eye surgery. The acceptance which the book received prompted Dr. Herbert M. Katzin, director of the Eye Bank Laboratory and associate surgeon at Manhattan Eye, Ear and Throat Hospital, to prepare a second, revised edition when the first was exhausted. He has used the book in his practice ever since its first appearance in 1949.

The material is slanted to parents and represents the point of view of the majority of ophthalmologists who do surgery on the ocular muscles. It is full of diagrams and easy to understand explanations of such matters as the effect of eye deviations on personality, how the eyes work together and focus, why they deviate, surgery, exercises and glasses in the treatment of crossed eyes, the "Lazy Eye," operations and post operative treatment. A glossary of applicable terms is presented and there is a table of contents but no index.

It seems that optometrists who refer children for eye muscle surgery might find the book useful, perhaps giving a copy to the parents either as an outright gift or as a loan. This would inform the parents and at the same time promote good public relations.

THOMAS H. EAMES, M.D.

BOSTON UNIVERSITY
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CURRENT COMMENTS

Terry Judith Parkins
Editorial Assistant

Optometrists will confer a favor by sending news items of general interest for this department; such as relate to new instruments, clinical techniques, education, visual health and optometric legislation and organization.

COMMERCIAL EXHIBITS AND REGISTRATION FEES.

The American Optometric Association has announced June 13-16, 1956, as the dates for the annual A.O.A. Congress. The convention city is Miami, Florida, and the hotel is the Seville. The A.O.A. has also announced that space for commercial exhibits at the Congress is now being sold. About 50 exhibit booths are available and it is expected that these will be subscribed for, by ophthalmic manufacturers.

The announcement has also been made that the A.O.A. Miami Congress registration fee will be $25 for optometrists who are members of the A.O.A. and $15 additional for their wives and guests.

No commercial exhibits were present at the A.O.A. Seattle Congress in 1954, or the A.O.A. Milwaukee Congress in 1955. Rochester, New York, in 1953, was the last A.O.A. Congress city to have commercial exhibits. These exhibits defray a substantial part of the convention expense.

Prior to the Seattle meeting in 1954, registration at the Congress for A.O.A. members was $15, plus $10 for wives. Without commercial exhibits at both Seattle and Milwaukee, the members' registration fee was increased to $25, plus $15 for wives of members. This raise was attributed to the loss of revenue due to the failure to have commercial exhibits. Now that the exhibits are back, is it necessary to continue the $25 member registration fee?

The total $40 registration fee for a member and his wife is sure to again hold down attendance. It did at Seattle and at Milwaukee. If commercial exhibits are to carry a substantial part of convention costs why not return the registration fees to $15 for members, plus $10 for their wives? A return to the old registration fees would increase attendance, making for an improved A.O.A. Congress and also give the exhibitors a better chance to realize on their investments, which are large for these commercial exhibits.

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February 1 to June 10

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FIRST PORTION SPRING SCHEDULE

STATE & CITY	DATE	TIME	TYPE COURSE	HOTEL
Texas				
Dallas	Wed., Feb. 1	7:00 p.m. to 10:00 p.m.	A & B	The Adolphus
Fort Worth	Wed., Feb. 1	7:00 p.m. to 10:00 p.m.	A & B	Hilton Hotel
Austin	Thur., Feb. 2	7:00 p.m. to 10:00 p.m.	A	Commodore Perry
San Antonio	Thur., Feb. 2	7:00 p.m. to 10:00 p.m.	A & B	The Gunter
Corpus Christi	Thur., Feb. 2	7:00 p.m. to 10:00 p.m.	A	Robert Driscoll Hotel
Houston	Sun., Feb. 5	1:00 p.m. to 5:00 p.m.	A & B	The Shamrock
El Paso	Sun., Feb. 5	1:00 p.m. to 5:00 p.m.	A	The Hilton Hotel
Arizona				
Phoenix	Mon., Feb. 6	7:00 p.m. to 10:00 p.m.	A	Hotel Westward Ho
California				
Los Angeles	Sun., Feb. 12	1:00 p.m. to 5:00 p.m.	A	Hotel Statler
Los Angeles	Sun., Feb. 19	1:00 p.m. to 5:00 p.m.	A	Hotel Statler
San Francisco	Sun., Feb. 19	1:00 p.m. to 5:00 p.m.	A	St. Francis
Hawaiian Islands				
Honolulu	Sun., Feb. 19	9:00 a.m. to 12:30 p.m.	A	Royal Hawaiian
Honolulu	Sun., Feb. 19	1:30 p.m. to 5:00 p.m.	B	Royal Hawaiian
Arkansas				
Little Rock	Tues., March 6	7:00 p.m. to 10:00 p.m.	A	Hotel Lafayette
Louisiana				
Shreveport	Wed., March 7	7:00 p.m. to 10:00 p.m.	A	Captain Shreve Hotel
Baton Rouge	Thur., March 8	7:00 p.m. to 10:00 p.m.	A	Heidelberg Hotel
New Orleans	Sun., March 11	1:00 p.m. to 5:00 p.m.	A & B	The Roosevelt Hotel
Alabama				
Mobile	Mon., March 12	7:00 p.m. to 10:00 p.m.	A	Battle House
Montgomery	Tue., March 13	7:00 p.m. to 10:00 p.m.	A	Whitley Hotel
Birmingham	Wed., March 14	7:00 p.m. to 10:00 p.m.	A & B	Dinkler Tutwiler Hotel
Memphis	Fri., March 16	7:00 p.m. to 10:00 p.m.	A & B	Hotel Peabody
Illinois				
Chicago	Sun., March 25	1:00 p.m. to 5:00 p.m.	A & B	Morrison Hotel

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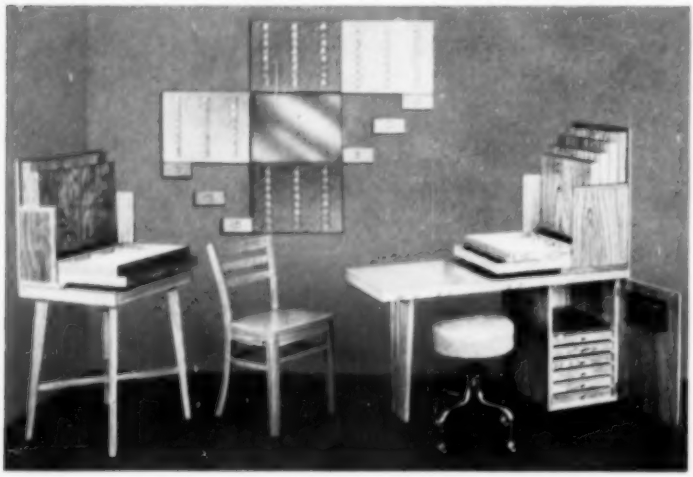

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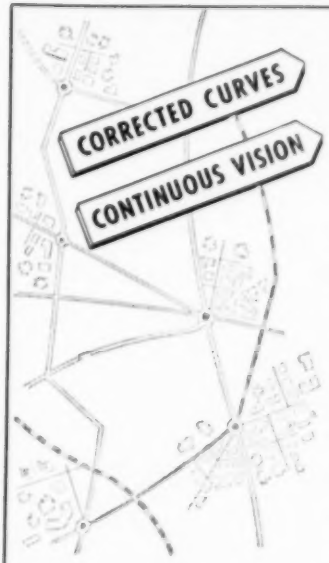

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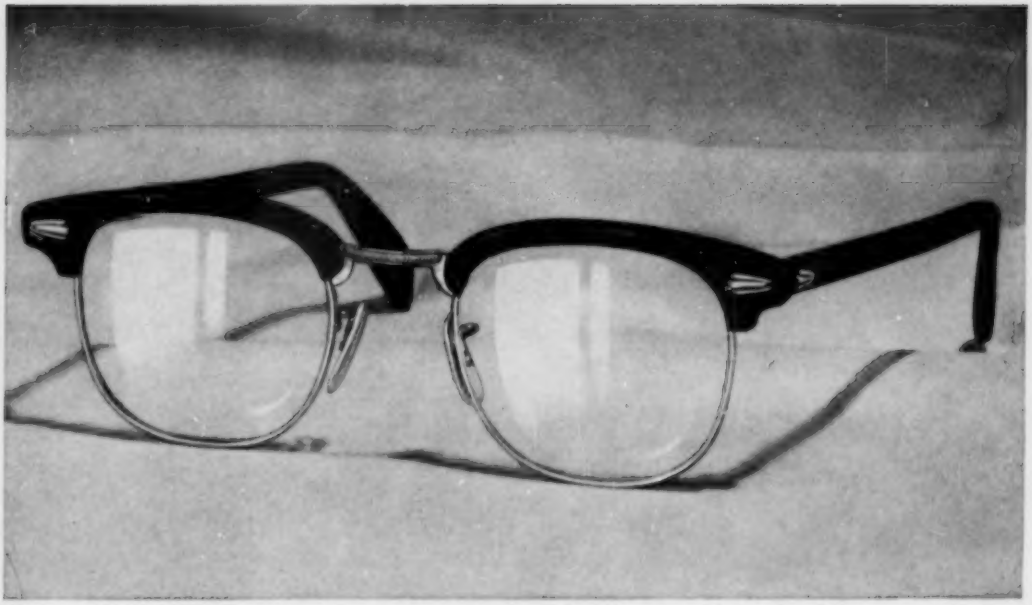

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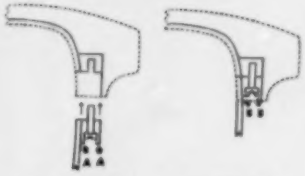

EARS OPEN EAPS CLOSED

HOW IT WORKS: *Insert eyewire screw in barrel and tighten in usual manner. Sketch at AA shows screw in barrel with "ears" open. Then with screwdriver, simply turn down the two ears over the screw head, as shown at BB. The screw is locked in, can't back out.*

MEN EXPECT their glasses to look well and wear well, and they're short on patience when little things go wrong.

Prescribe Mansfram with Barreloc and you'll keep them happy! Barreloc is one of those simple little construction features which saves a lot of time and trouble. Screws can't loosen, lenses can't fall out and break.

For sheer good looks, too, we recommend Mansfram—in Cordovan and Mello, Ebony and White or the handsome new Dusk Gray and White.

Minnesota Optical Company

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RONBELLE® BROWLINE® FRAME

Nine interchangeable colored top rims . . . five temple styles—in a full range of eye and bridge sizes that permit you to fit more feminine patients—lower your service costs.

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Practical styling and precision fitting that men appreciate. No thick rim to interfere with vision — perfect for multifocals. Eight colors . . . complete selection of sizes and tempie styles.

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